

Comparison of the skin dose in TPS with the phantom measurement for the head and neck radiation treatment patients

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Purpose

- Skin dose issue for Head and Neck Patients
 - Head and neck patients are radiation-treated on the couch tops with thermoplastic mask
 - Dose perturbation is occurred by the mask and leads the change of surface dose.
- Skin dose was underestimated in TPS compared to the measurement on phantom.
- To minimize the dose perturbation by the thermoplastic mask and skin dose, accurate dose calculation on treatment planning system(TPS) is required.
- **This study aims to avoid the underestimation of the skin dose by body immobilization devices on TPS(Varian Eclipse 15.6, AAA algorithm) compared to the phantom measurement.**

Materials & Methods

1. Measurement on Rando phantom
 - OSLD(optically simulated luminescent dosimeter)s for Rando phantom measurement
 - 6MV, 180 MU, 180~220° Gantry rotation, IMRT beams
 - Thermoplastic mask for the immobilization of Rando phantom
 - Head and neck patient plan was applied to the IMRT beam delivery of Rando phantom
2. TPS calculation
 - Varian Eclipse 15.6, AAA algorithm
 - 6 MV, 200 MU/min
 - TPS body extension: Body contours enlarged from original skin

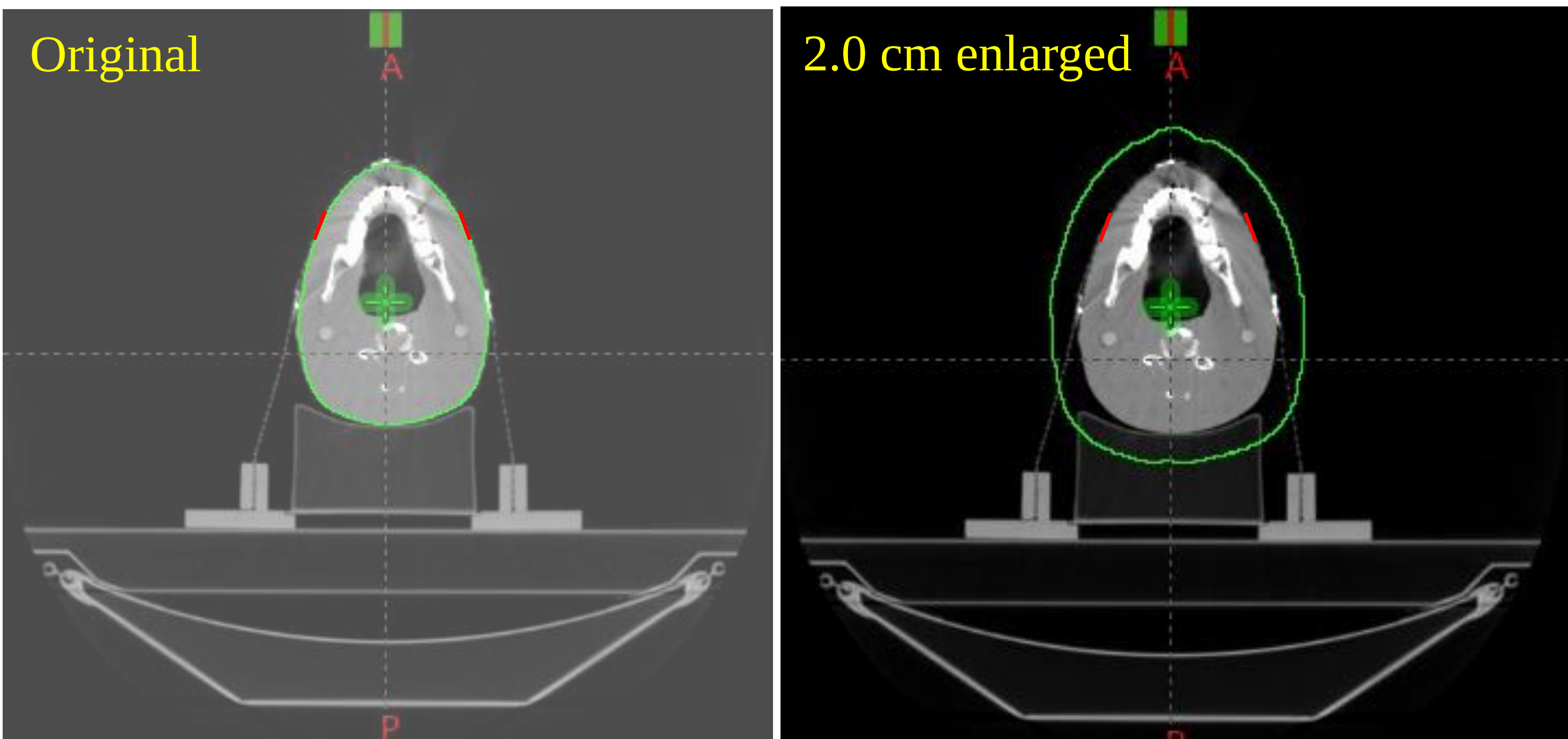


Fig.1 An axial view of phantom comparison of dose distributions for an H&N cancer patient treatment with 6 MV IMRT beams

Results & Discussion

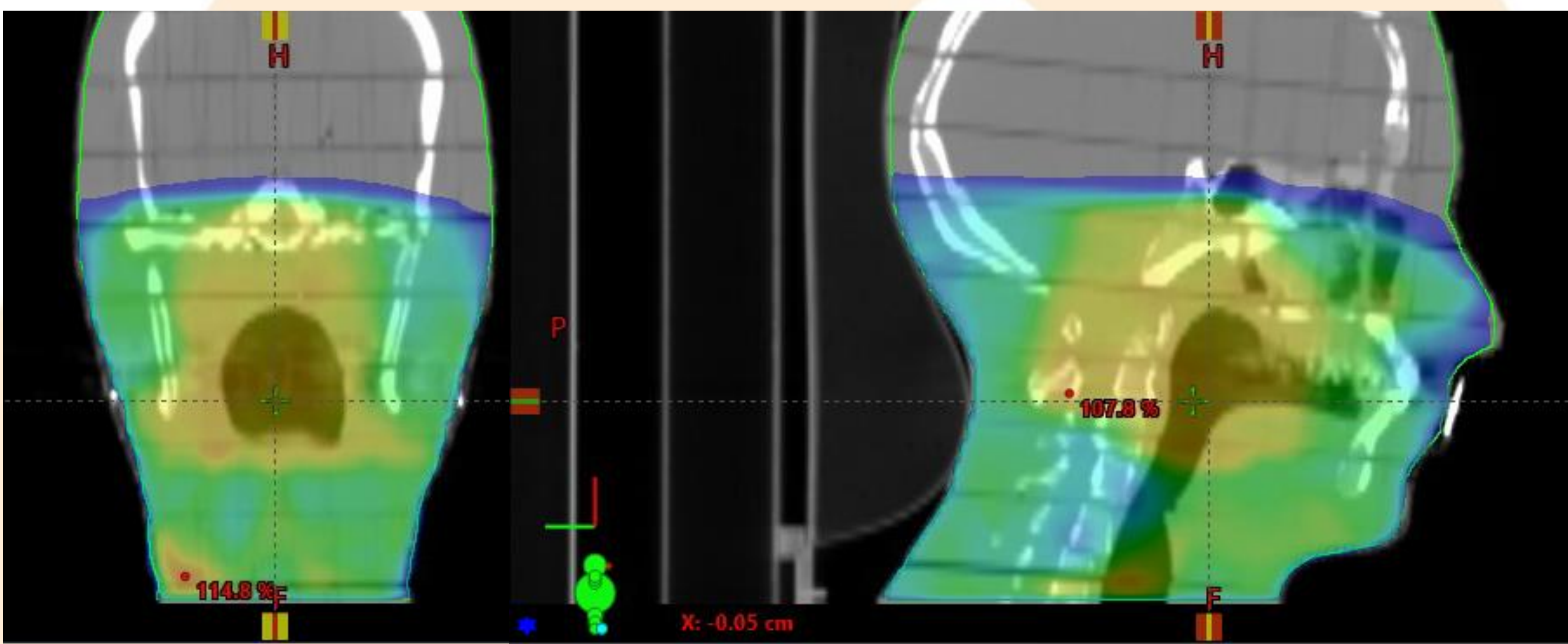
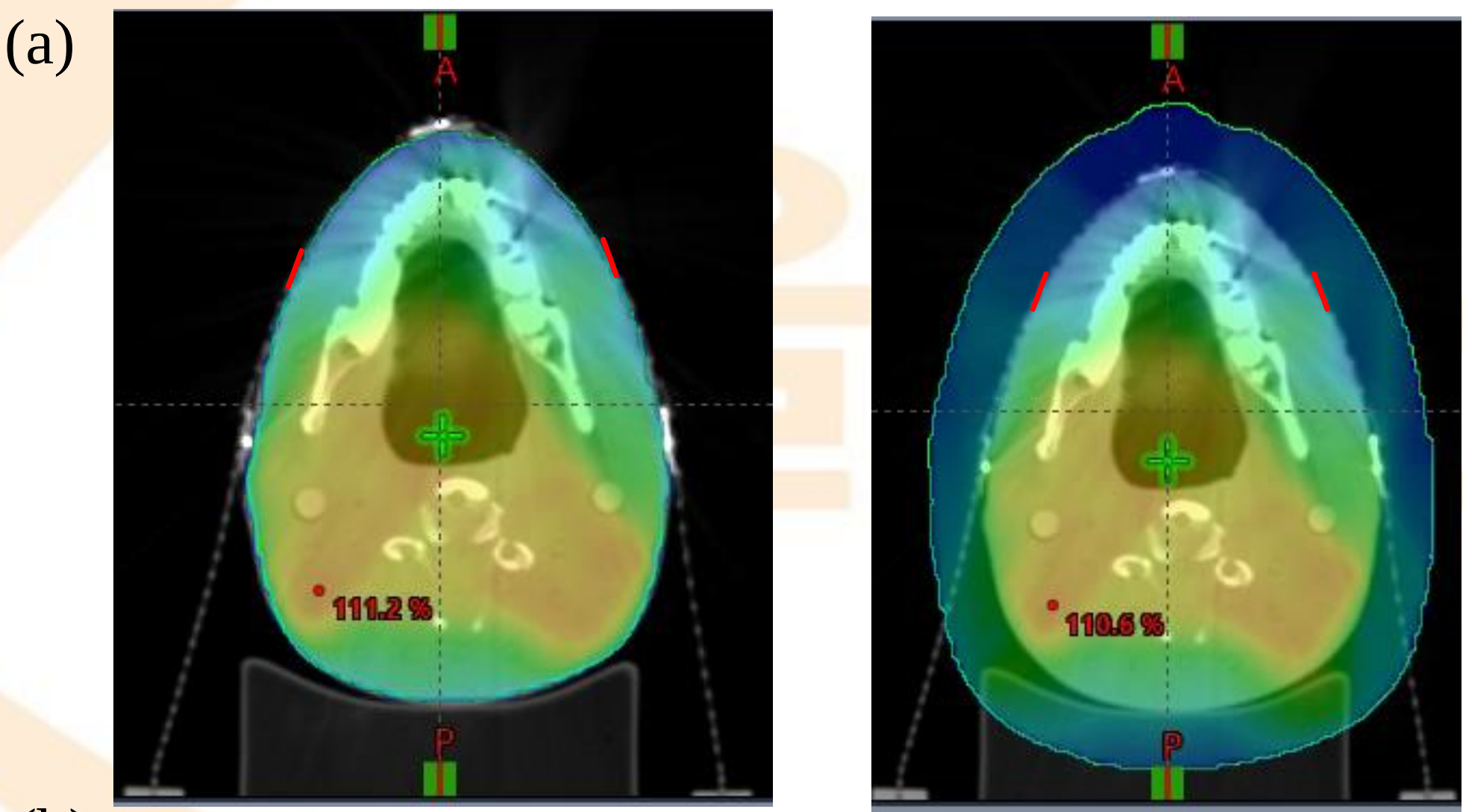


Fig.2 TPS calculation on Rando phantom for an H&N cancer patient treatment with 6 MV IMRT beams



(b)

		AAA, default	AAA, 2 cm contour expanded	OSLD measurement
Relative dose (%)	Left chin	23.2	36.7	39.9
	Right chin	36.1	44.3	46.1

Fig.3 (a) Axial CT slice showing the location of the contoured skin structure (b) Comparison of dose profiles calculated by AAA for the H&N case treated with 6 MV IMRT beams

- ❖ Results:
 - The skin dose calculated in TPS and measured using the phantom were matched with the expanded body contour.
 - For H&N treatment plan, body contour extension showed more accurate calculation results.
- ◆ Conclusion
 - We have experimentally verified the underestimation of skin dose calculation in TPS when the radiation treatments using body immobilization devices. Contour margin extension in TPS showed more accurate result than the original calculation.

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