**Accuracy of dose attenuation correction for a 6D carbon fiber treatment couch using a virtual couch technique integrated into a treatment planning system**

**Innovation/Impact:**
A commercial 6D carbon fiber radiotherapy treatment couch (Imaging Couch Top, BrainLAB) has recently been reported to attenuate photon beams and increase skin dose. This couch was added to the latest version of the treatment planning system (TPS, Eclipse v10.0, Varian). To prevent skin toxicity and ensure the target dose, it is important to correct the attenuation properties of the treatment couch with the TPS. In this study, we evaluated the accuracy of dose attenuation correction by a virtual couch technique integrated into the TPS so that this technique can be efficiently applied for clinical purposes.

**Data for this study:**
We evaluated the accuracy of dose attenuation correction for the treatment couch by a virtual couch technique integrated into the TPS. The computed tomography (CT) value of the kilovoltage-CT images of the treatment couch was assigned to the CT value of the virtual couch. The CT value of the surface of the virtual couch was −280 HU and that of the interior was −920 HU. A comparison of the measured and calculated doses is shown in Figure 1. The dose difference is expressed as

\[
\text{Dose Difference [\%]} = \frac{D_{\text{meas}} - D_{\text{calc}}}{D_{\text{calc}}} \times 100, \quad \text{(Equation 1)}
\]

where \(D_{\text{meas}}\) is the measured dose and \(D_{\text{calc}}\) is the calculated dose (TPS dose).

![Figure 1](image-url)

Figure 1. Comparison of the measured and calculated doses (a) with virtual couch technique in TPS and (b) those without attenuation correction.

Figure 1 shows that the largest difference between the measured and calculated doses was −3.3% for a gantry angle of 120° in 6 MV-stereotactic radiosurgery (SRS) mode (Trilogy Tx, Varian). The average dose difference was within −1.6% for all gantry angles and photon beams. In the case without attenuation correction, the largest difference was −8.2% and the average difference was −5.2% in 6 MV-SRS mode.

The results of our study show that the virtual couch technique in TPS accomplished sufficient accuracy for dose attenuation correction of the 6D carbon fiber treatment couch, and hence, it is an effective method for clinical use.