

Purpose: The purpose of this study is to establish on-site IMRT audit in Japan. **Method and materials:** We developed IMRT audit system using specialized water phantom. The phantom can be used to calibrate dose of reference condition and to validate monitor unit of conventional and IMRT field. In the specialized water phantom, detector can be set up at various positions, and various detectors can be used by replacing sleeves. The protocol of IMRT plan referred to shape and dose constraints of NCI "IMRT benchmark". The planned IMRT dose was verified according to own QA protocol at each site. Then, audit items were evaluated by visit. The audit items were $TPR_{20,10}$ for k_Q determination, dose at reference condition (10 cm depth, 10×10 cm² field), output factor (5×5 , 10×10 , 20×20 cm² field), dose linearity (0.5, 1.0, 5.0 Gy) to evaluate basic commissioning status of RTP. Furthermore IMRT point dose at isocenter and geometrical arrangement of axial plane were evaluated with an ionization chamber and EDR2 verification films. The on-site IMRT audit was done for 9 beams at 8 sites in 2009. **Results:** For reference condition, dose monitor unit (cGy/MU) was well adjusted within 1% at all sites. For IMRT point dose, difference between self and audit evaluation agreed within 1% at all sites. However dose difference between calculated and measured exceeded 3%, lack of commissioning was consequently pointed out at 2 sites. The reproducibility of geometrical arrangement was less than 3 mm at all sites. **Conclusion:** Feasibility study of on-site IMRT audit was performed using specialized water phantom to reduce measurement uncertainty. It is confirmed that the on-site IMRT audit combined reference and IMRT condition is reliable. To establish IMRT on-site audit in Japan, visit site will be increased in 2010.