Purpose: There are many water-phantom scanning systems with advanced features to collect accurate commissioning data. However, the intra- and inter-variability of commissioning data has not been reported which is attempted in this study.

Methods: Four vendors with modern water-phantom scanning systems; PTW, Sun Nuclear (SN), Standard Imaging (SI) and IBA were invited to an institution to demonstrate beam data collection. Each system was used to collect percent depth dose (PDD) and profiles several times in a day with their choice of detector for four different machines for photon and electron beam commissioning. This provided information on intra-variability. At the end, each vendor was allowed to setup and collect data on a single unit for inter-variability. All data were sent to a central location for analysis and evaluation.

Results: The depth dose and profiles for 2x2cm² and 10x10cm² fields were analyzed for intra- and inter-variability. With repeated measurements, the intra-variability provided a detailed degree of fidelity of data collection. This was shown to be within (±0.1%) among all vendors. Ignoring data in buildup region and comparing with one system (PTW), the PDDs variability were slightly larger 0.02Â±0.17%, 0.14Â±0.21%, 0.17Â±0.2%, for SI, SN and IBA, respectively. The profiles inter-variability in central region were <0.1%, however in penumbra up to Â± 4.8% were observed. The polarity effect was also noted up to 3% which was depth and detector dependent.

Conclusions: Intra- and inter-variability among various scanning system are very small indicting that all modern systems if used properly could collect data within Â±0.2% accuracy. The selection of device should be based on institutional comfort and personal preference of software and hardware. This study provides unique opportunity to compare data among systems which is otherwise not possible.