

Purpose: Total body irradiation (TBI) with moving couch technique has been used in our clinic for years. Moving couch TMR for a field size has been acquired by multiplying TMR for a stationary beam and the 'm factor' defined as the ratio between moving phantom dose to stationary beam dose for same setup. The 'm factor' has been known to be field size dependent and not depth dependent. In order to replace lung and kidney blocks and achieve better dose uniformity using dynamic MLC, comprehensive understanding on the TMR for variable field sizes for an MLC leaf sequence is required.

Method and Materials: A thorough measurement on the moving TMR has been performed. TMR's for field sizes of 5cmx40cm, 10cmx40cm, 15cmx40cm, 20cmx40cm and 30cmx40cm were measured both for the stationary and for the moving phantoms. Field sizes are defined at SAD 100cm and TMR's were measured at SCD 170cm for depths d_{max} to 34cm in 50cmx50cmx50cm water phantom with 6MV photon (21EX, Varian, Palo Alto, CA).

Results: TMR's in moving phantom for different field sizes showed not more than 1% difference, while those of stationary phantom showed up to 34.8% difference for different sizes. The m factor which has been known to be a constant for a given field size rapidly increases after 15cm depth. Analysis of the data allowed us to understand the phenomena of measuring a point dose in a moving phantom. The key to the understanding was that both the phantom scatter and primary dose seen at the measurement position does not vary with field size when normalized to the reference condition.

Conclusion: TMR's are independent to field size when couch is moving. This suggests that TMR variation does not need to be considered when designing the dose compensator with dynamic MLC for moving couch TBI.