

**Purpose:** Topotherapy is a new delivery technique that uses the binary MLC to implement static beam IMRT. We present a simple approach for real time motion adaptive delivery (MAD) of topotherapy plan using the current delivery system.

**Methods:** Topotherapy uses fixed jaws and binary MLC for intensity modulation and its projection rate is a few Hz. Topotherapy delivery is controlled by a planned projection-wised leaf sequence, which is optimized assuming stationary target. The couch proceeds in constant speed. To compensate longitudinal tumor motion in real time, instead of sequential execution of the planned leaf sequence, the projections are out of order executed. That is, a previous or future projection that with the same planned target position as the current status, is chosen instead. The transversal target motion is further compensated by shifting and scaling the MLC leaf open time at the chosen projection.

**Results:** Extensive simulations with realistic topotherapy parameters and respiration motions validate MAD technique. The delivered dose conformed well to the target regardless how target moved during delivery. Significant margin reduction could be approached provided that real time tumor localization is achievable.

**Discussions and Conclusions:** We present a novel technique for real time MAD in topotherapy. Unlike the dynamic MLC based tracking method, this technique requires neither the whole target motion trajectory nor the velocity of target motion. Instead, it only requires instantaneous target positions, which greatly simplifies the system implementation. This technique re-uses the planned leaf sequence by re-ordering its projection and leaf sequence. It does not involve time consuming re-optimization. The simulations validated the presented technique. Experimental validation and extension to helical tomotherapy delivery is presented in another paper of this conference.