AbstractID: 13341 Title: Investigation of the influence of aperture rotation on the dose profiles of proton patch fields

The use of proton patch fields that are stopped on the lateral boundary of a master field is common practice in passively delivered proton radiation therapy, as it allows for effective coverage of target volumes in close proximity to critical structures, e.g., the spinal cord. In a typical patient set-up scenario, initial orthogonal radiographs are taken to align the patient in three dimensions relative to the proton beam isocenter and a beam's eye view (BEV) x-ray image of the master field is taken to verify correct alignment and to perform final corrections. As part of these corrections, frequently an aperture rotation is required to account for rotational misalignment of the patient relative to the beam profile. Similarly, subsequent fields patching on the master field are verified with BEV x-ray images prior to treatment and appropriate corrective moves and aperture rotations are made. To date, no studies of the influence of aperture rotations on the delivered proton treatment across various clinical configurations have been published.

We are currently performing a systematic study of clinical proton patch-field combinations using our proton treatment planning software (Odyssey, Permedics). Performing incremental rotations of both the master and patch fields in the treatment plan, will determine the effect on the DVH for both the gross tumor volume (GTV) and organs at risk (OAR). Study endpoints include deviations from the maximum, minimum and mean dose delivered to GTV and OAR prescribed by the clinician. This study covers a range of clinical scenarios, including tumors of the cervical spine, tumors of the paranasal sinus, frontal lobe gliomas, and parasacral tumors. It is expected that the results of this study will result in practical guidelines for the setup of proton patch-field combinations.