AbstractID: 8140 Title: Immobilisation in stereotactic radiotherapy: comparison of thermoplastic mask systems

The accuracy of stereotactic radiotherapy treatments is significantly dependent on the accuracy of patient repositioning. This study reports the results of a high-resolution comparison of three thermoplastic mask systems comprising two different stereotactic systems, one for intracranial and one for head and neck lesions (BrainLAB), and a system for regular radiation therapy treatments (Med-Tec). The two stereotactic systems have anterior and posterior components with approximately midline fixation whereas the radiation therapy system uses a single component mask fixed to a posterior base plate. Volunteers identified appropriate anatomical landmarks on consecutive high-resolution CT scans to quantify repositioning accuracy. The data was analysed to give displacements in each of three dimensions, the uncertainty of the analysis is determined by the voxel size and is +/-0.7 mm axially and +/-1.0 mm in the superior/inferior direction. The results show that both the stereotactic systems provide comparable intracranial relocatable accuracy which is somewhat patient specific but generally within a range of +/- 2 mm (SD 0.4-0.8mm, 5 patients, 425 samples). The radiation therapy system gives results within the range of +/- 4 mm (SD 1.8 mm, 3 patients, 42 samples). The head and neck stereotactic system showed a degradation extracranially with inferior distance to a range at C5 of +/- 3mm (1 patient, total 148 samples). No directional dependence was observed in repositioning accuracy. The improved accuracy of the stereotactic systems is most likely due to the use of a posterior mask component and midplane fixation which optimises the rigidity of the mask.