Purpose:
The 3-point thermoplastic Orfit mask and BrainLAB stereotactic mask provide immobilization of the head in fractionated radiotherapy. The purpose of this study was to compare the setup accuracy of these two masks using pre-treatment kV-CBCT and ExacTrac®.

Methods:
Both BrainLab and Orfit masks are currently used in our institution. The BrainLab mask is a two-part masking system custom fitted to the front and back of the patient's head. This mask is used in conjunction with the ExacTrac-based patient positioning. The Orfit 3-point mask is shaped to the patient's head similarly but also encompassing the superior aspect of the head. As part of our current setup procedure for patients immobilized by Orfit mask, daily portal images and weekly kV-CBCT image sets are acquired pre-treatment. In this study, kV-CBCT data from 6 Orfit patients (122 fractions) fixated with the Orfit mask and ExacTrac data from 11 patients (153 fractions) immobilized by the BrainLab mask were retrospectively analyzed. Daily patient positioning was evaluated as the translations between the pre-treatment and reference image after fusion registration.

Results:
The mean inter-fraction displacements in 3D were 2.7±1.4 mm (max=6.4mm) and 3.3± 1.8 mm (max=7.9mm) for Orfit and BrainLab groups, respectively. The mean displacement and systematic setup uncertainty for the Orfit patients were -0.3±1.0, -1.0±1.4, and -1.0±1.3 mm in the lateral, superior-inferior and anterior-posterior directions, respectively. For the BrainLab patients, the mean and systematic setup uncertainties were 0.2±0.8, -1.3±1.8, and -0.9±2.5 mm in the lateral, anterior-posterior and superior-inferior directions, respectively.

Conclusions:
Both masks showed comparable performance in term of setup uncertainty. Daily image guidance is recommended with either immobilization system to optimize the accuracy of setup.