

# Stereotactic Body Radiotherapy: comparison between two IGRT systems

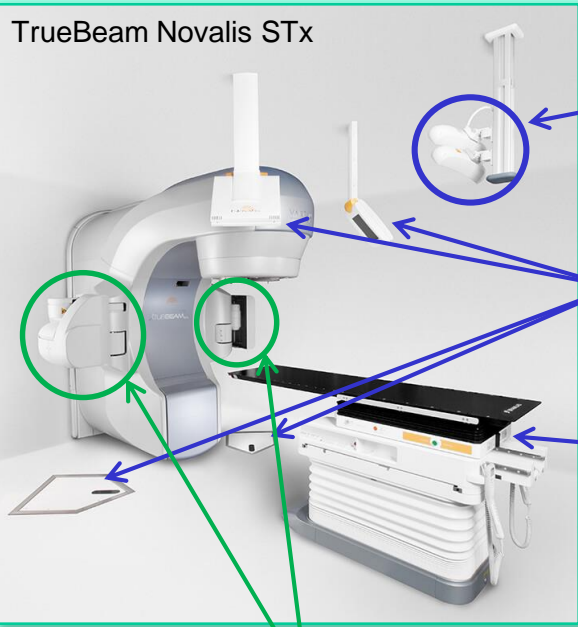
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TrueBeam Novalis STx



**Infrared optical system:** performs patients pre-positioning and follow patient movements through body markers.

**X-Ray imaging system:** verifies target position using bone anatomy through two X-ray tubes and flat panels.

**Robotic Couch:** 6 degree of freedom (Vert, Long, Lat, Rot, Pitch, Roll).

**ExacTrac  
X-Ray**

**CBCT:** verifies target position using bone and soft tissues anatomy.

What are residual setup errors between ExacTrac and CBCT for SBRT treatments ?

## Scenery:

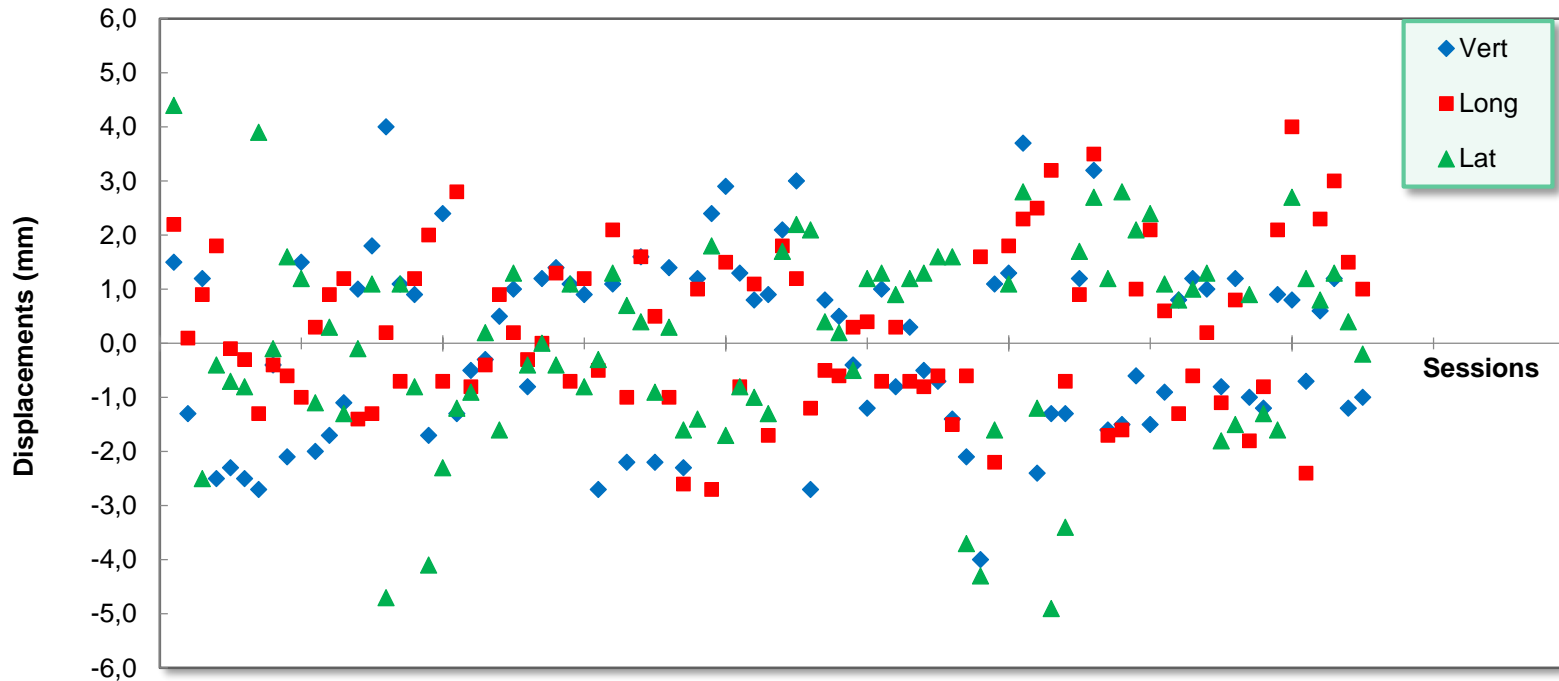
- ✓ January - November 2017
- ✓ 45 patients with SBRT treatments
- ✓ 53 lesions (some patients having more than one lesion) and 152 treatment sessions
- ✓ Prescribing doses: 24 - 60 Gy in 3 fractions or 20 Gy in a single fraction
- ✓ Planning techniques: dynamic conformal arc therapy or hybrid intensity modulated radiotherapy with no-coplanar fields.

## Methods:

- All patients were initially located using personalized immobilization systems and setup corrections were determined and corrected by means of registrations of ExacTrac X-Ray images with the corresponding digitally reconstructed radiographs using the ExacTrac 6D fusion
- At the end of each treatment session, with the couch at 0°, the residual setup errors were determined by means of registrations of CBCT images with the planning CT using online 3D fusion and for each session.

**Results:** A modest difference in residual setup errors was found between ExacTrac system and CBCT. The average of the observed residual displacements for the three space directions, in absolute value, was 1.5 mm in vertical and in lateral directions, 1.2 mm in longitudinal direction.

Residual setup errors



## Conclusions:

- Good agreement on the setup accuracy between ExacTrac X-Ray and CBCT for patients treated with SBRT
- The two systems present comparable precision
- ExacTrac offers additional benefits such the capability to quantify all rotational errors, fastest automated positioning in 6D even for no-coplanar fields and smaller doses, representing a valid alternative to CBCT with complementary information in image-guided stereotactic radiotherapy.