

Breast voluntary breath-hold monitoring: a comparison of an in-house laser-camera and an integrated gating system

David Bernstein, Katie Kettlewell, Lee Corsini, Jamie Callan, Alison Ranger

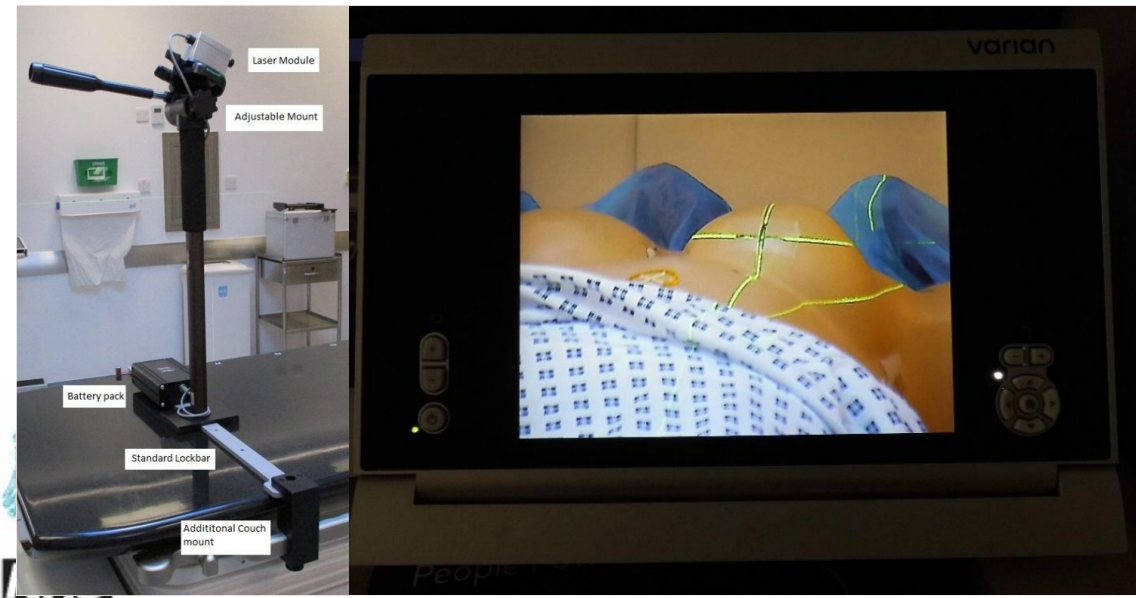
David.Bernstein@rmh.nhs.uk

16.04.26



Aim

An observational study of breast patients treated using the laser-camera system was performed to determine TrueBeam gating system parameters that resulted in at least comparable gating window widths.



Method

15 patients receiving voluntary breath hold breast radiotherapy

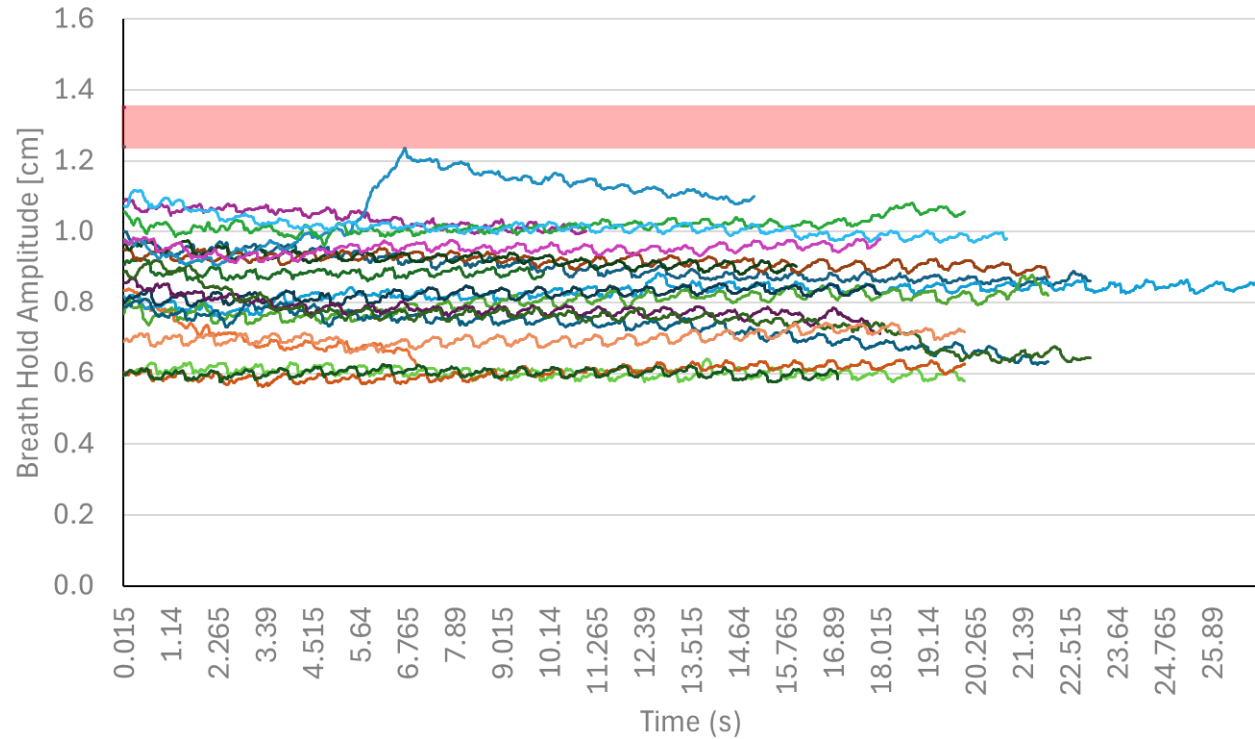
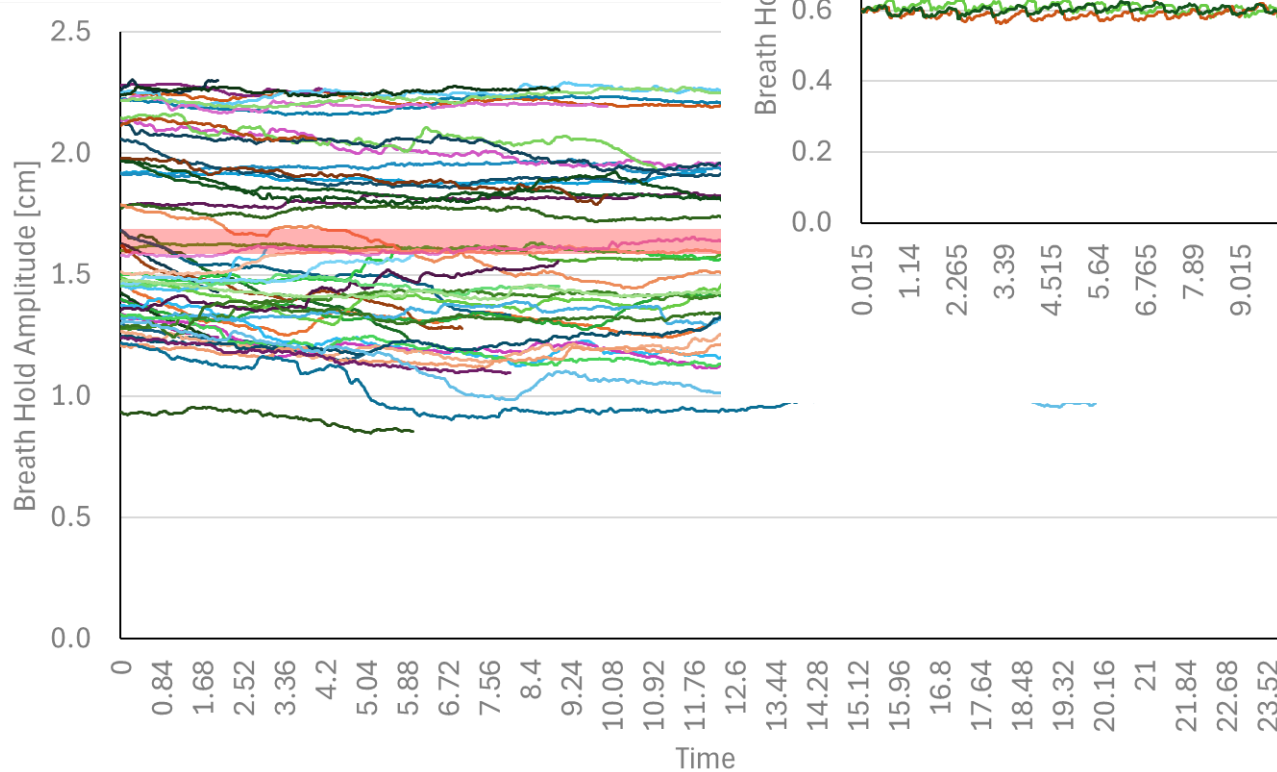
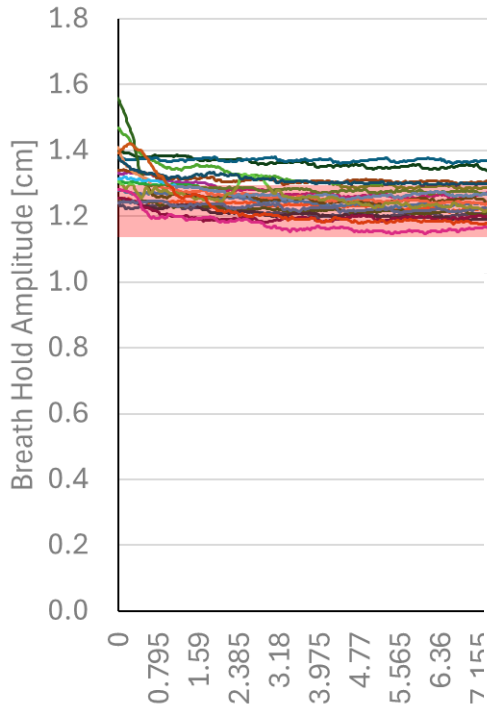
The laser-camera system was used to guide and monitor patients' breath-holds during CT and treatment.

Simultaneously, the reflector block was positioned and the RGSC and TrueBeam gating system amplitude data collected for retrospective analysis.

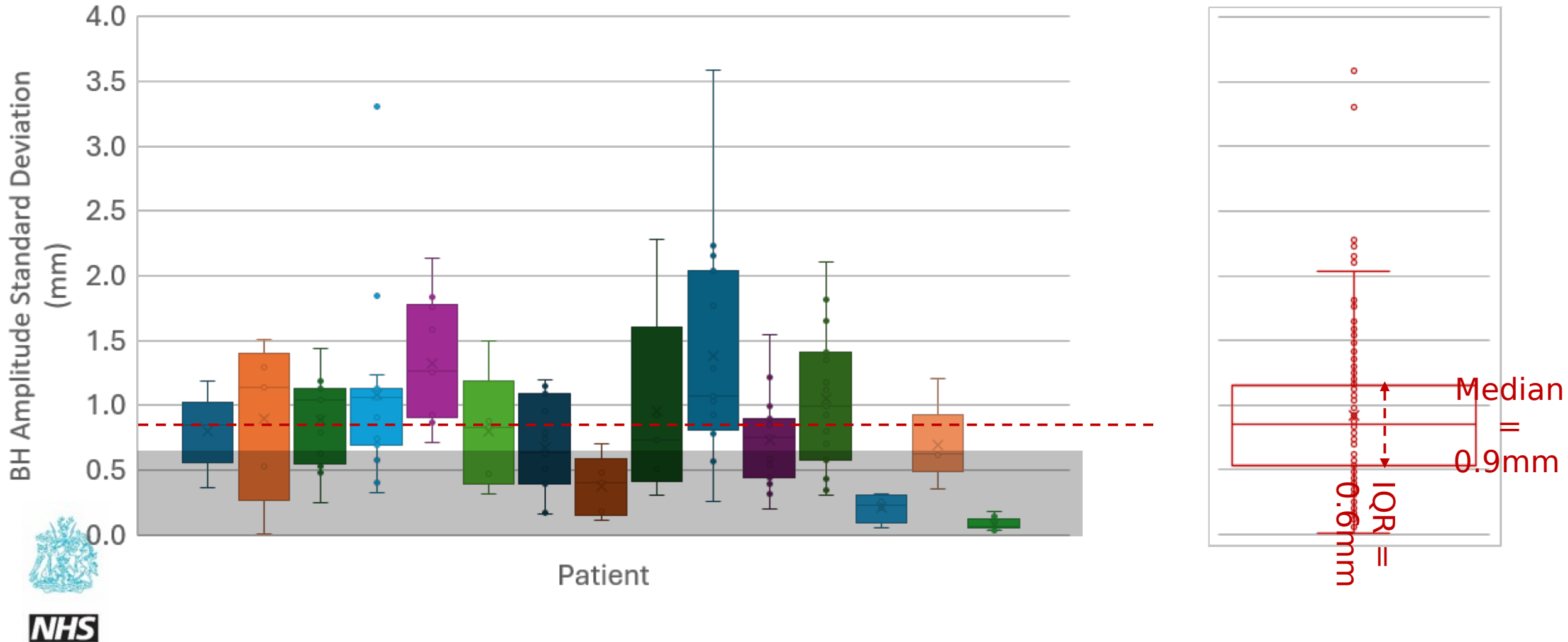
To assess the reliability of the reflector block data, changes in anterior-posterior separation between CT and CBCTs in breath-hold were compared against changes in amplitude measured using the reflector block.



Laser-camera: breath hold variation examples during beam on

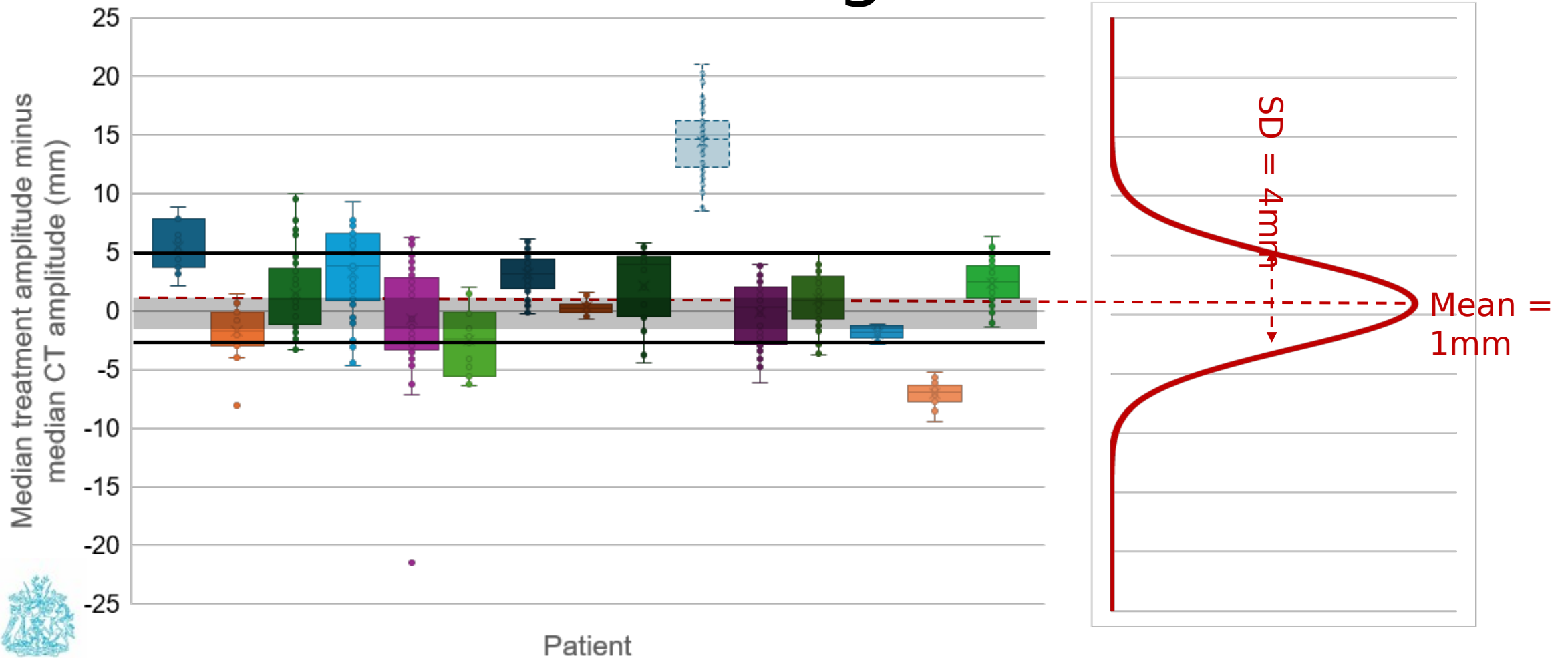


Laser-camera **intra**fraction breath hold variation during beam on

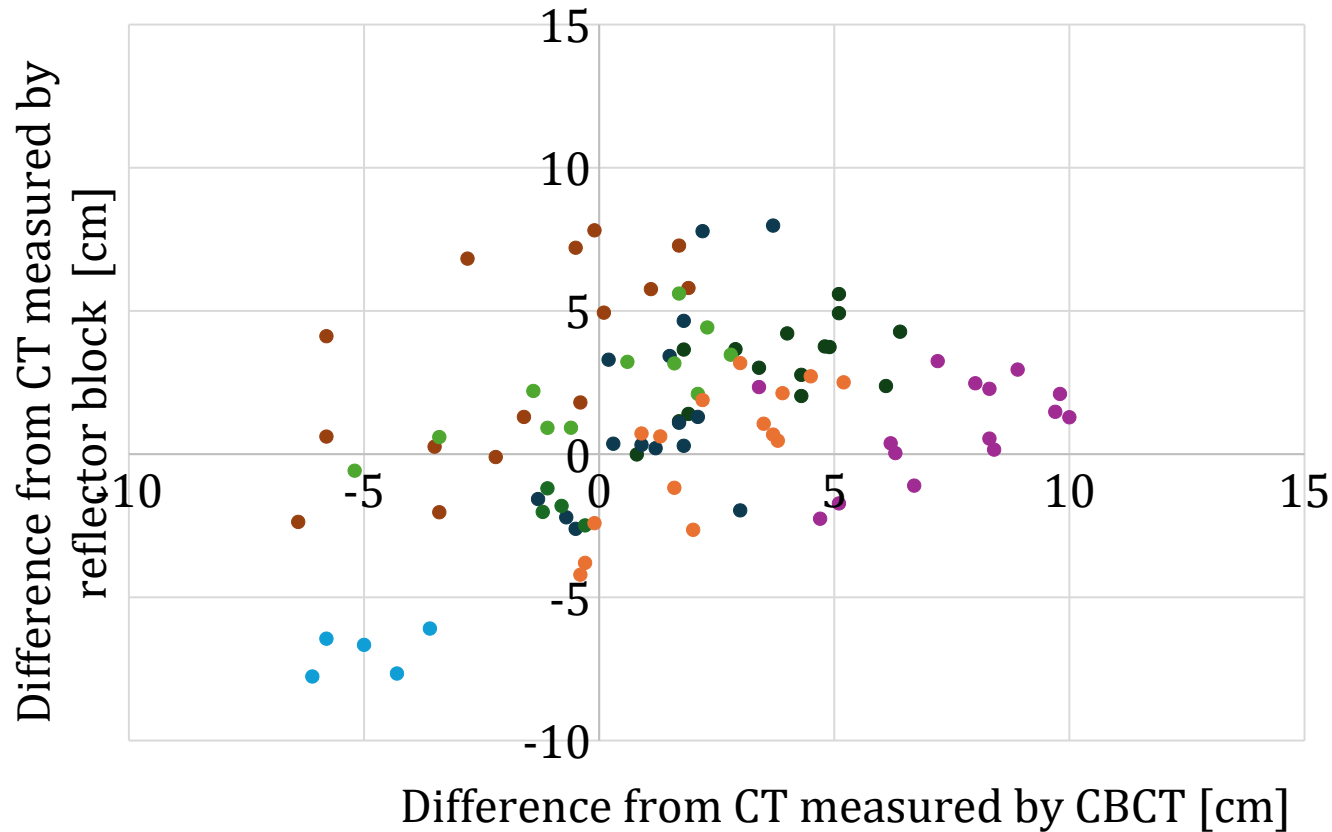


NHS

Laser-camera **inter**fraction breath hold variation during beam on



Correlation between CBCT-CT separation and gating block amplitude



Patient	Pearson correlation coefficient	Number of fractions	P-Value
All	0.37	99	<0.001
1	0.80	15	N/A
2	-0.70	4	N/A
3	0.38	5	N/A
4	0.44	15	N/A
5	0.63	15	N/A

Conclusions

BH gating amplitude thresholds set as -3mm to +5mm relative to planning CT amplitude

- This will give less variation in BH amplitudes relative to the laser-camera system

In-house camera-laser system alone is unreliable.

- It resulted in consistent intra-fraction breath hold amplitudes, but
- Inconsistent inter-fraction breath hold amplitudes

Reflector block alone is unreliable.

- Breath hold amplitude represented by the reflector block only had limited agreement with CBCT-CT measured amplitudes

CBCT separation must be confirmed to be acceptable at every fraction instead of relying on surrogates alone.

- This is justifiable as intra-fraction breath hold amplitude is consistent

