

Prostate volume changes in longer fractionated and ultrahypofractionated MR-guided adaptive radiotherapy: leveraging the MOMENTUM registry

Sian Cooper¹, Hafid Akhiat², Sophie Alexander¹, Filippo Alongi^{3a/3b}, Erwin Blezer⁴, Ananya Choudhury², John Christodouleas², Juan Diaz², Cihan Gani⁶, Shaista Hafeez⁷, William A. Hall⁷, Paul Jeene⁸, Marco Luzzara², Floris Pos⁹, Tine Schytte¹⁰, Helena Verkooijen^{6,9}, Danny Vesprini¹¹, Jochem Van der Voort van Zyp⁴, Paulien Westhoff¹², Alison Tree¹

Affiliations:
1) Royal Marsden NHS Foundation Trust, London, UK; The Institute of Cancer Research, London, UK
2) EMM, Stockholm, Sweden
3) Advanced Radiation Oncology, IRCC Ospedale Santo Spirito Don Calabria, Cancer Care Center Megar (Verona), Italy
4) University of Brescia, Italy
5) University Medical Center Utrecht, Utrecht, Netherlands
6) Division of Cancer Sciences, University of Manchester and The Christie NHS Foundation Trust, Manchester, United Kingdom
7) Universitätsklinikum Tübingen, Tübingen, Germany
8) Medical Center of Wisconsin, Froedter Hospital, Wisconsin, United States
9) Radiotherapiegroep, Dordrecht/Arnhem, the Netherlands
10) Netherlands Cancer Institute - Antoni van Leeuwenhoek, Amsterdam, Netherlands
11) Odense Universitetsklinisk, Odense, Denmark
12) Sunnybrook Health Sciences Centre, Toronto, Canada
13) Radboud Universiteit Medisch Centrum, Nijmegen, Netherlands

IUC25511-79· NCT04075305

THE QUESTION

Does the prostate swell during treatment, can we predict who is at risk and is it clinically significant?

COHORT

1,612

patients · MOMENTUM registry, prospectively collected

Jan 2020–Apr 2025 · multicentre, international

1,390

SBRT
5–7 fractions

222

LFRT
≥8 fractions

METHOD

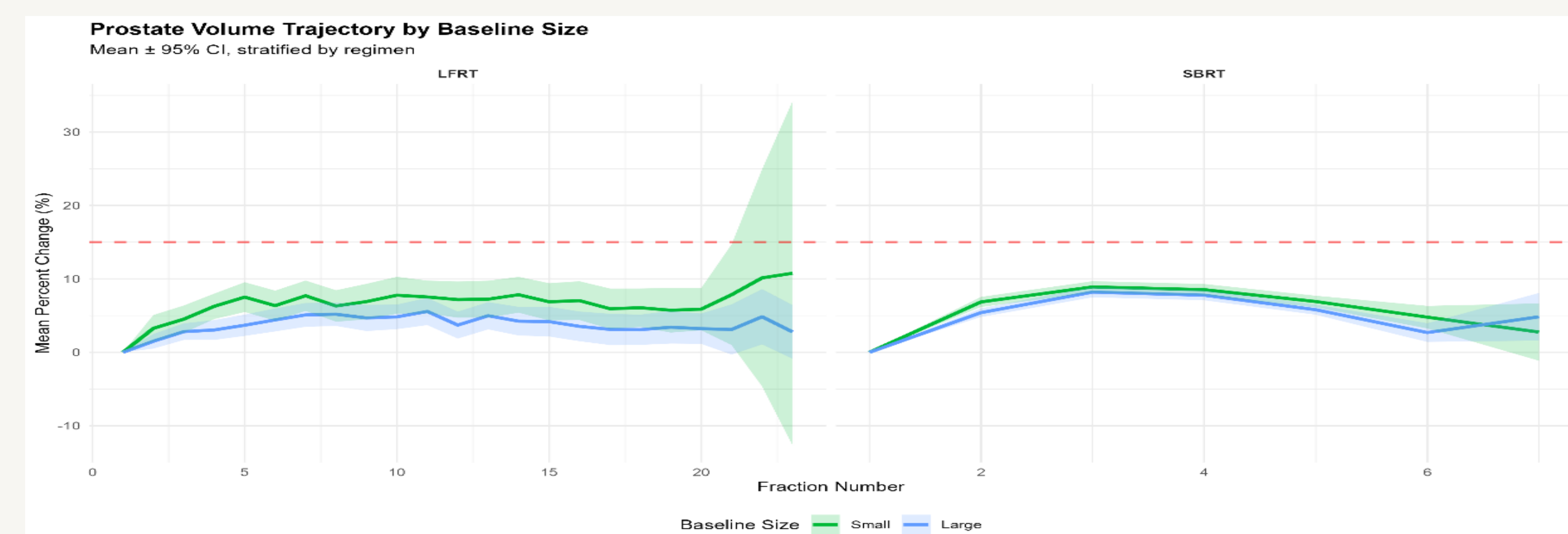
- 1 Daily MRI · 1.5T MR-Linac
- 2 Fraction-specific prostate volume
- 3 Linear mixed models + logistic regression
- 4 Spheroid margin modelling

BASELINE VOLUME MATTERS

SBRT 47.5cm³ vs LFRT 40.0cm³

median baseline prostate volume

Smaller gland → more susceptible to crossing the 15% threshold



HEADLINE RESULT

36%

of patients showed ≥15% swelling
at any point during treatment

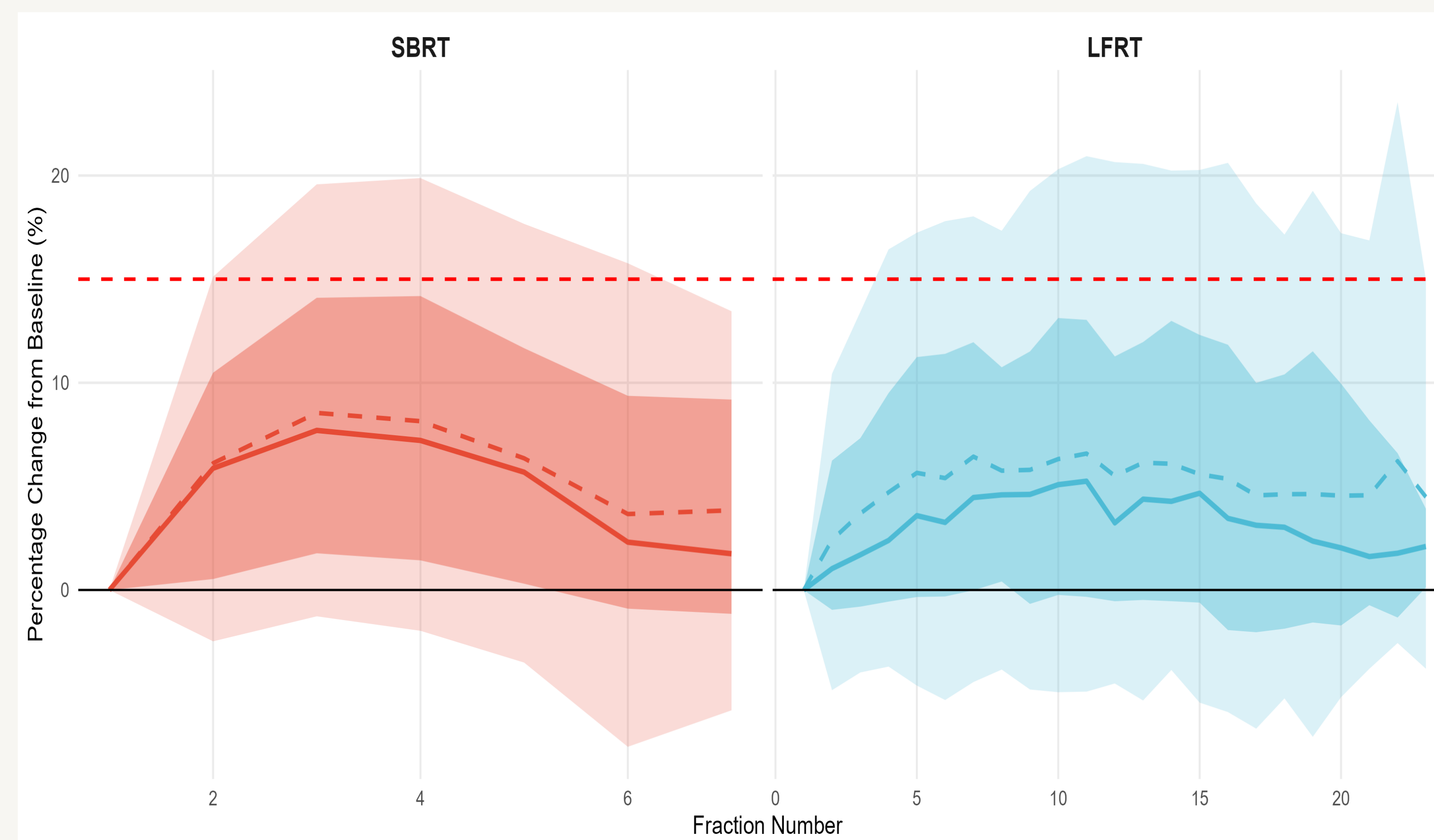
34.8%

SBRT cohort

45%

LFRT cohort

SWELLING TRAJECTORY



SBRT swelling peaks early then resolves · LFRT rises gradually across the course

WHAT PREDICTS SWELLING?

OR 0.41

Larger baseline prostate volume is protective against swelling (LFRT)

95% CI 0.23–0.72, p=0.002

NOT INDEPENDENTLY PREDICTIVE

Age

ADT use

T-stage

Fraction #

CLINICAL MARGIN IMPACT

0.4%

of patients needed >3mm margin
to accommodate observed swelling

0 patients exceeded 5mm

EARLY PREDICTION

External validation, n=219

LFRT: early-phase change predicted later swelling well

SBRT: less robust as the peak occurs too early (fraction 3)

TAKE-HOME

Swelling is common but geometrically modest.

Standard margins remain adequate for nearly all patients.