# Reducing Planning Target Volume Margins in Paediatric Radiotherapy

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## Goal

- To assess whether radiotherapy planning target volume (PTV) margins in paediatric patients can be safely reduced with the aim to limit radiation exposure to healthy tissue and decrease long-term neurocognitive late effects

## Objectives

- Determine whether reduced PTV margins for paediatric radiotherapy can be done without compromising target volume (tumour) coverage.
- Quantify reductions in irradiated normal tissue with smaller margins
- Assess whether reduction in irradiated normal tissue volumes can predict change in neurocognitive outcomes using existing validated models

## Study

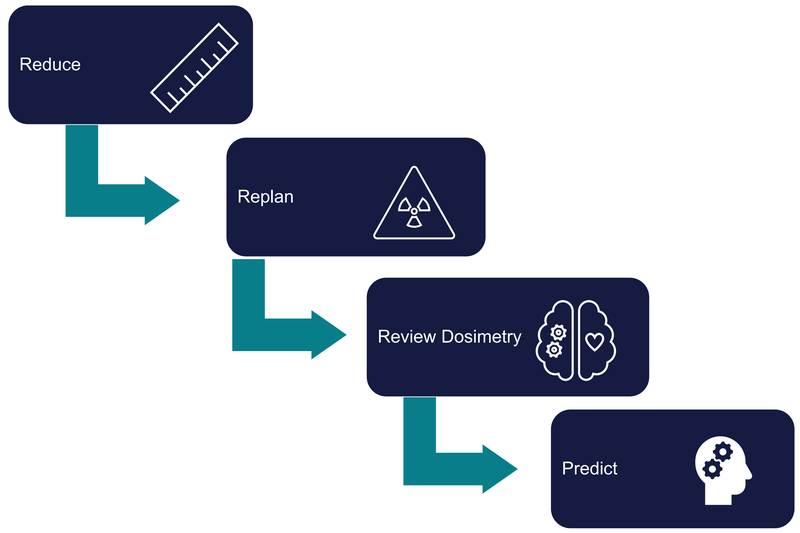
- Pilot feasibility study using retrospective radiotherapy planning and imaging data from paediatric patients previously treated without anaesthesia. Existing treatment plans are re-evaluated using reduced PTV margins

## Method

- Pre-treatment CT and MRI and on-treatment cone beam CT images were utilized
- Radiation therapists regenerated treatment plans using smaller PTV margins (2mm compared to traditional 3mm) while maintain adequate tumour coverage
- Normal tissue volumes were quantitatively compared between original and reduced-margin plans

## Preliminary Results

- Reduced PTV margins were feasible without compromising tumour coverage
- Margin reduction led to decreased radiation exposure to normal brain and head-and-neck structures
- Many of these structures are traditionally associated with late neurocognitive toxicity
- Final statistical analyses are ongoing




## Impact / Outcomes

- This study intends to augment practice to ensure safer, more precise paediatric radiotherapy planning with potential to reduce long-term neurocognitive and psychosocial toxicity
- Results will inform revised institutional PTV guidelines and the design of a future prospective trial to improve childhood cancer survivorship outcomes

## Project Timeline

**Start:** July 2025
**End:** March 2027

- Months 1–4: Imaging review and initial re-planning
- Months 4–12: Iterative re-planning and outcome comparison
- Months 13–17: Statistical analysis and manuscript preparation