Breakout Session 1: Track A

Implementation of a Public Data Challenge for MRI-Guided Tumor Segmentation in Head and Neck Cancer Patients

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AI/ML Readiness for Head and Neck Cancer MRI Data

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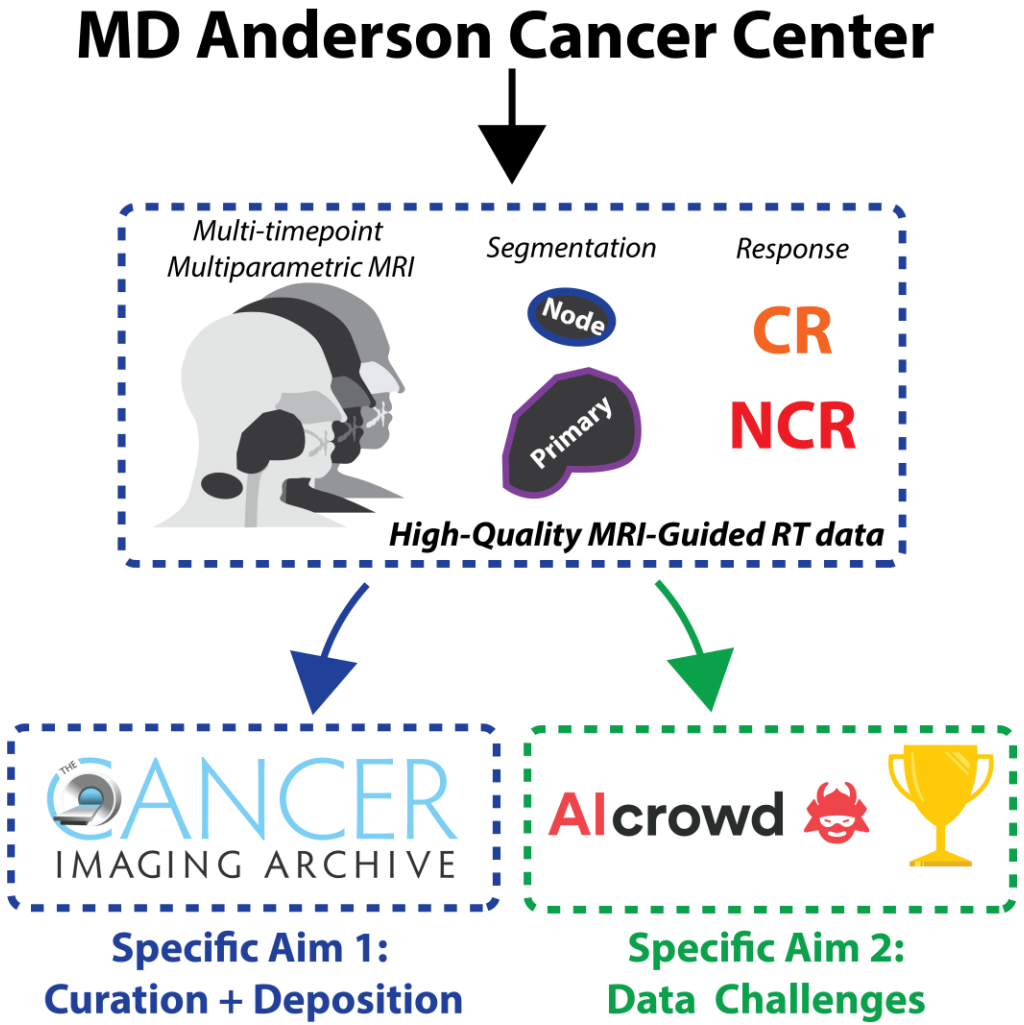
AI/ML Readiness Supplements

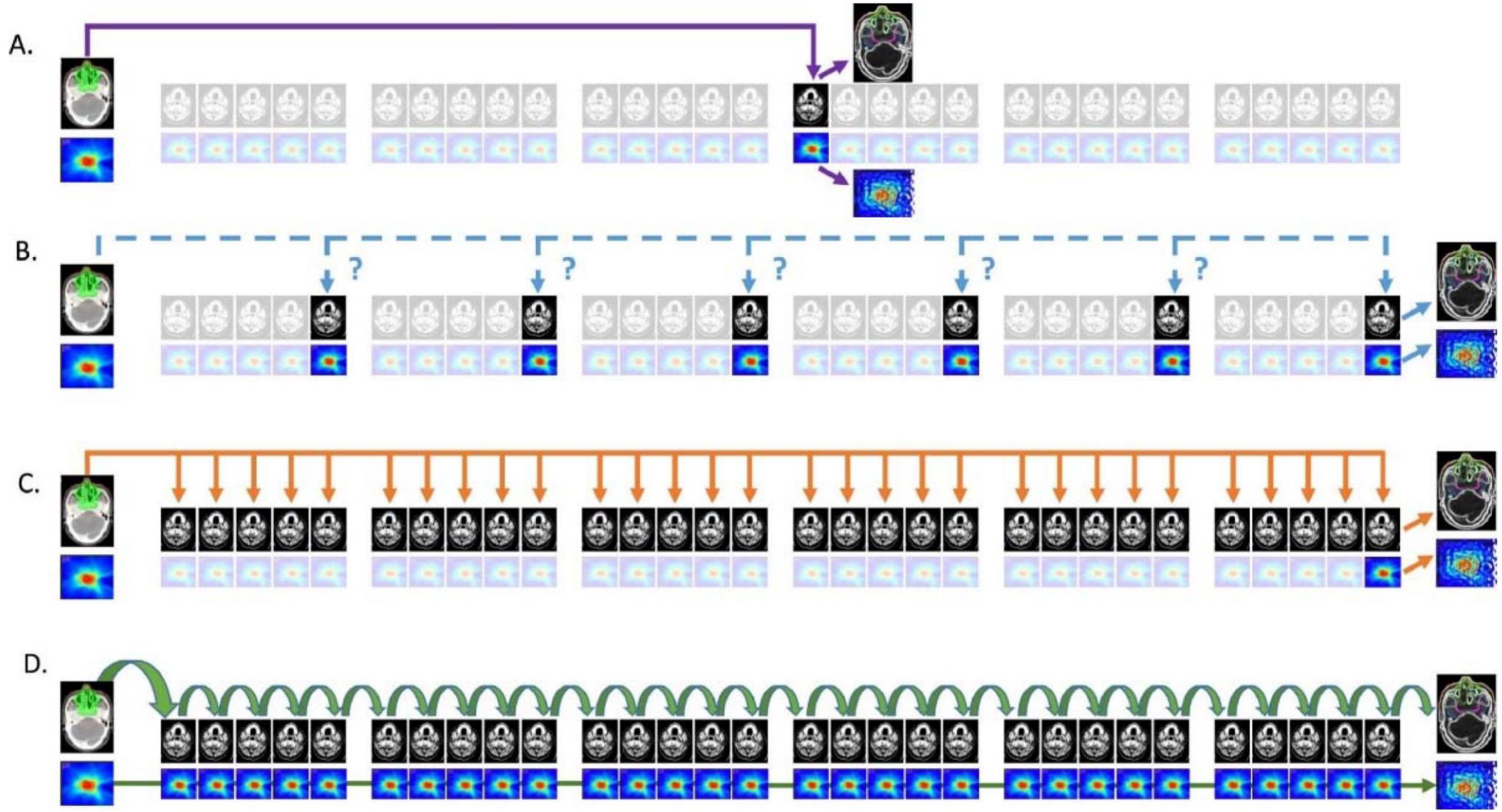
- *3R01CA257814-03S2*;

SCH: Personalized Rescheduling of Adaptive Radiation Therapy for Head & Neck Cancer

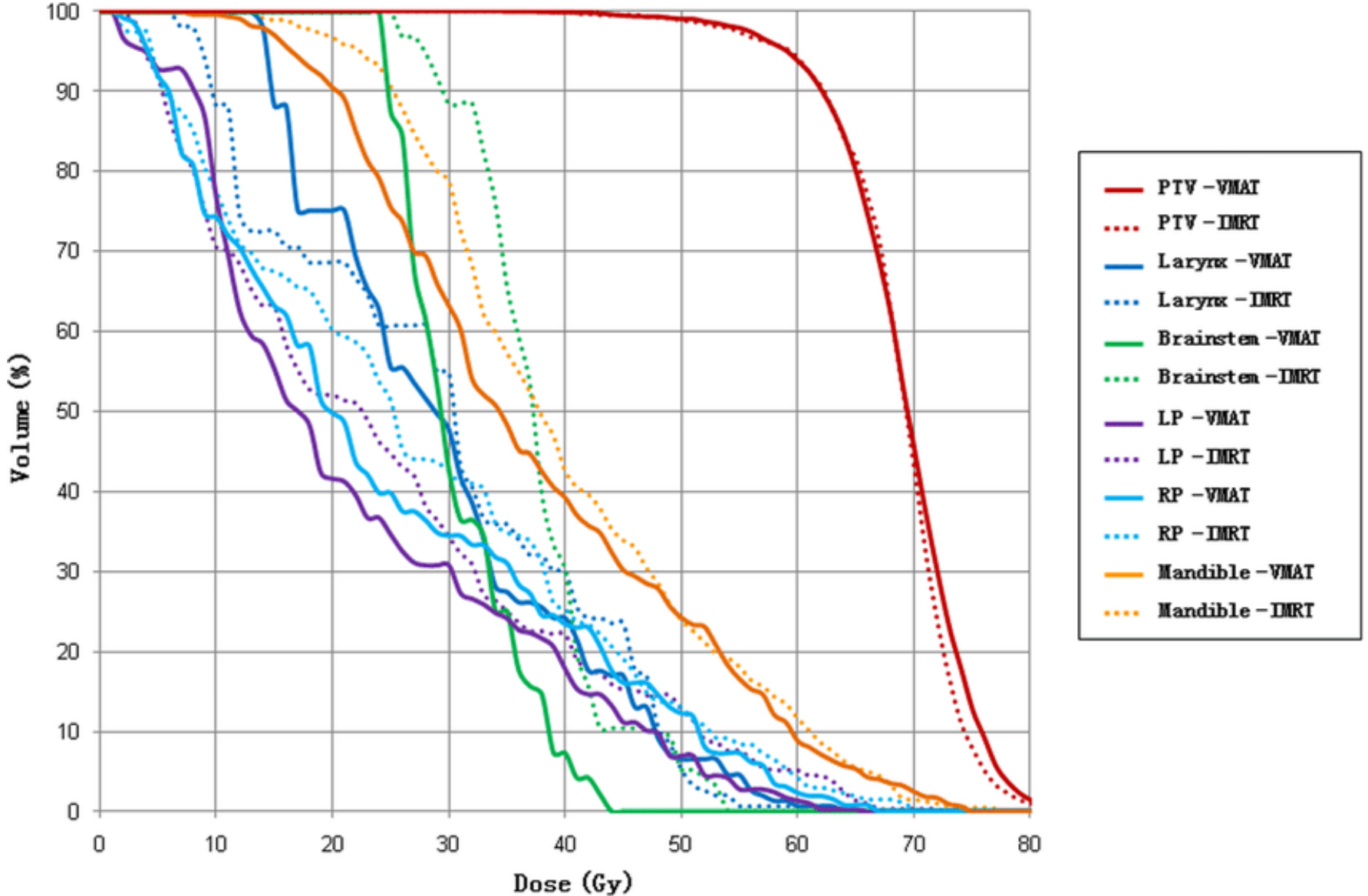
”There is an *unmet need to systematically curate, pre-process, and disseminate multi-timepoint multi-parametric HNC MRI data* and corresponding *multi-observer annotations for public use* in AI models for adaptive RT applications. The following specific aims will act as a supplement to the existing parent grant to **provide the research community with high-quality and re-usable RT benchmark dataset of established provenance**.”



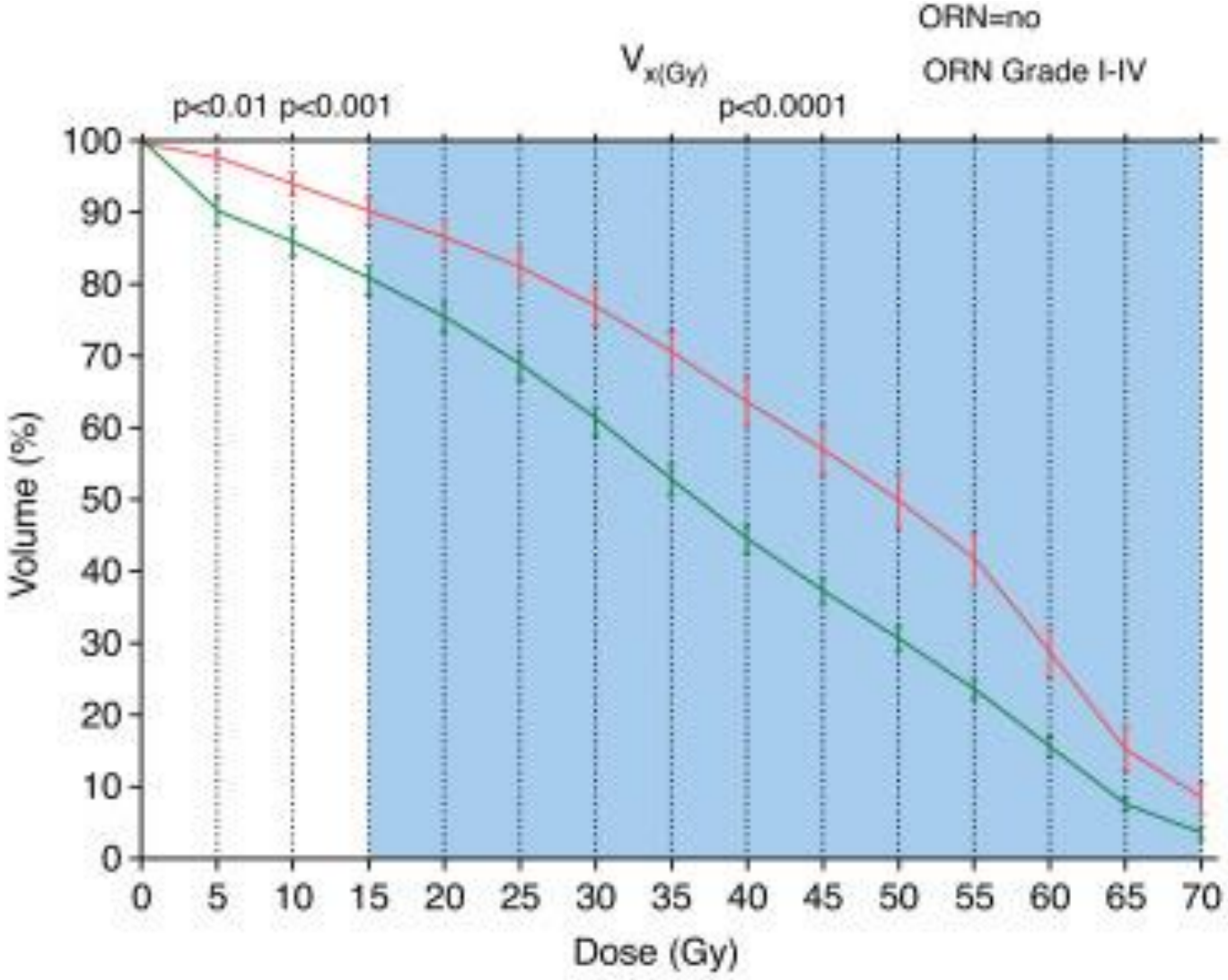
Adaptive RT==new daily dose



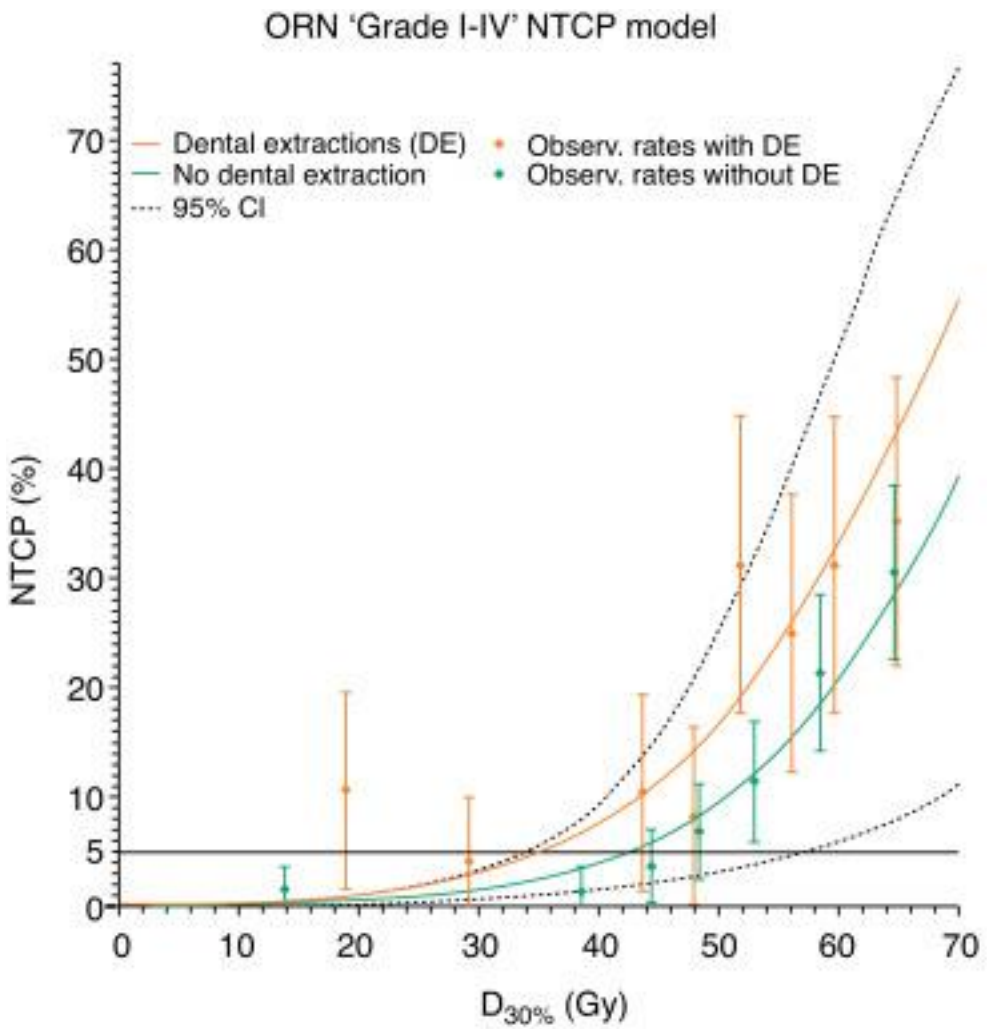
Dose-volume histogram

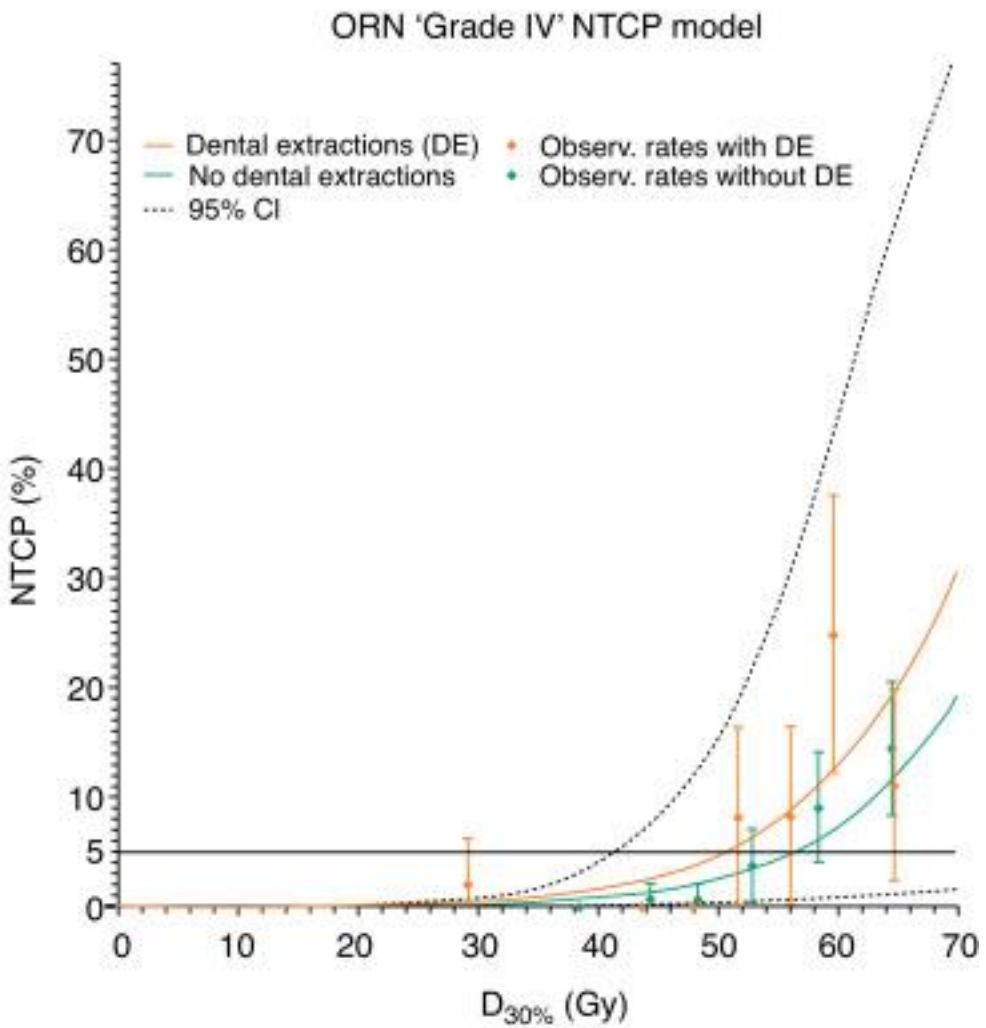


Dose-volume histogram for organ at risk (OAR) (mandible) toxicity

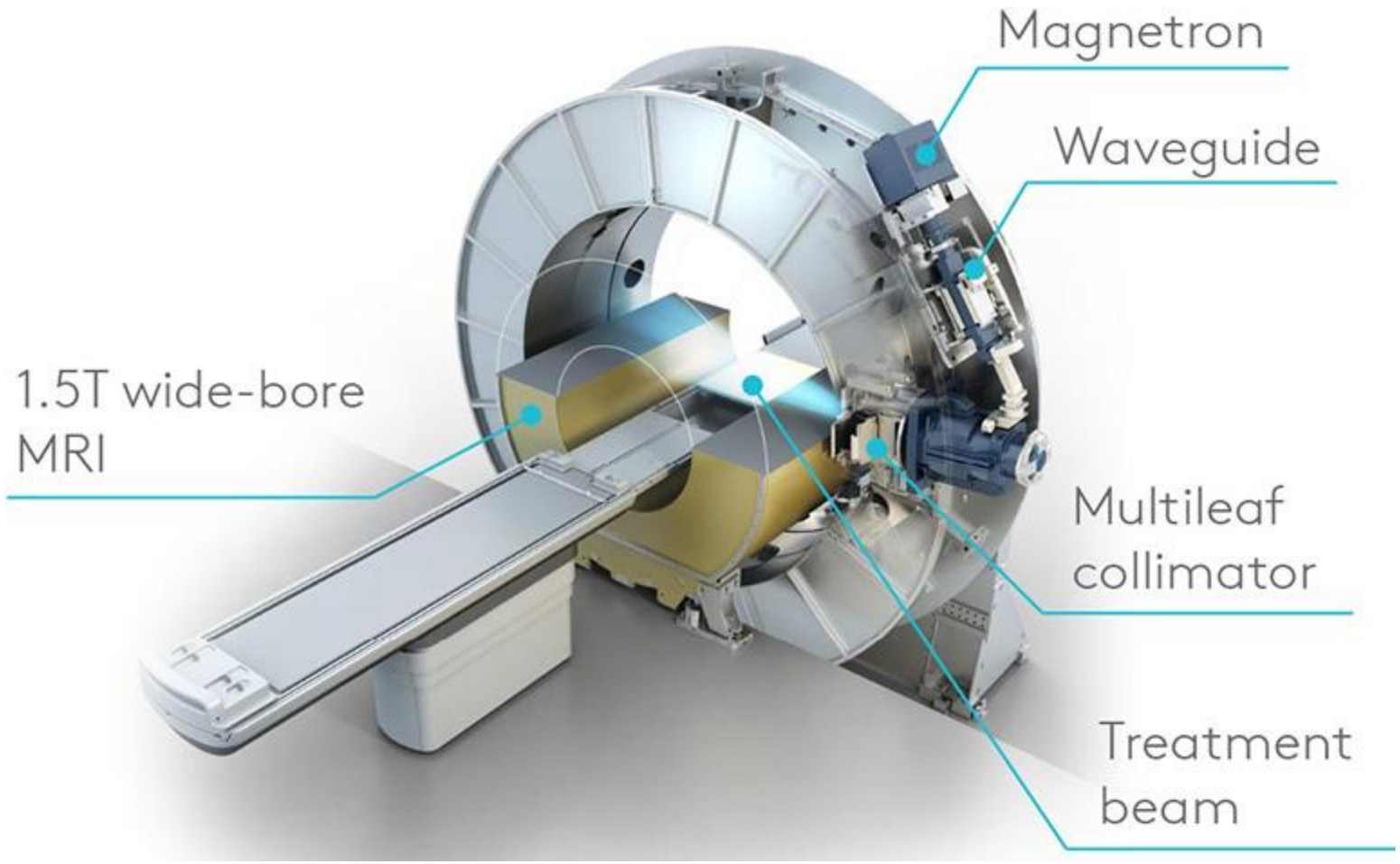


Normal tissue complication probability (NTCP)

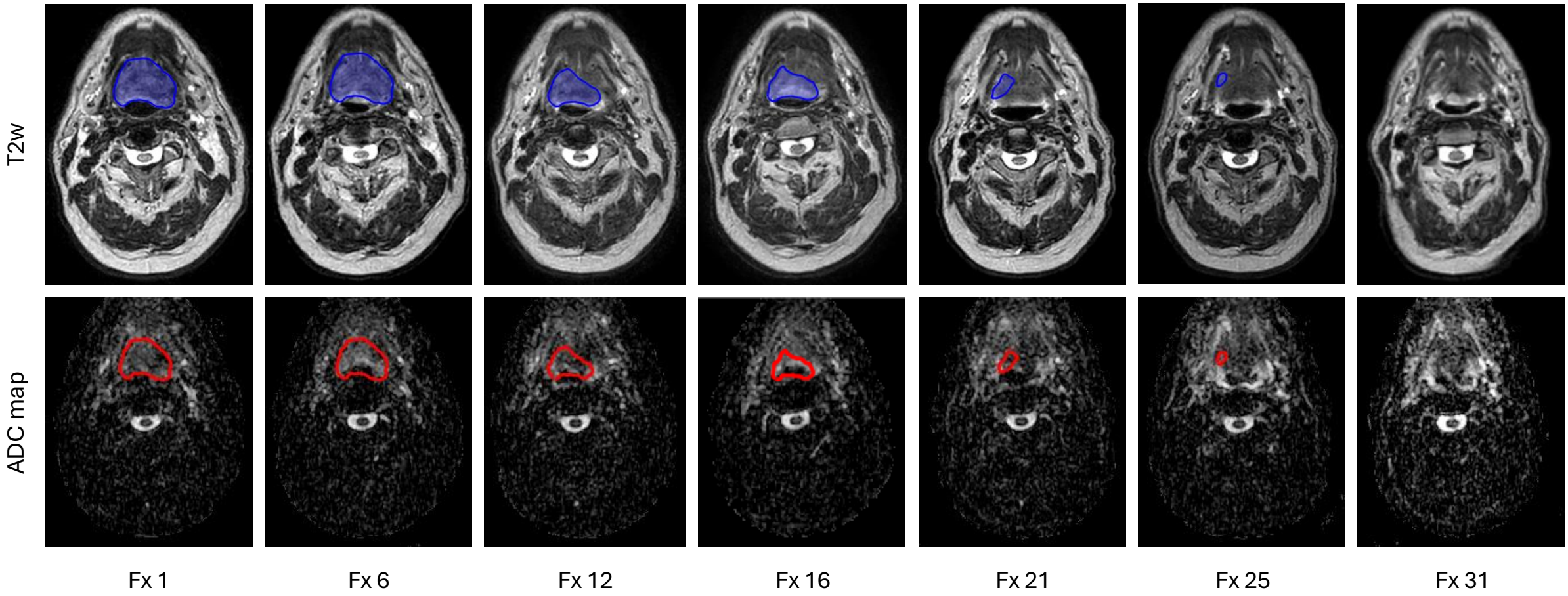




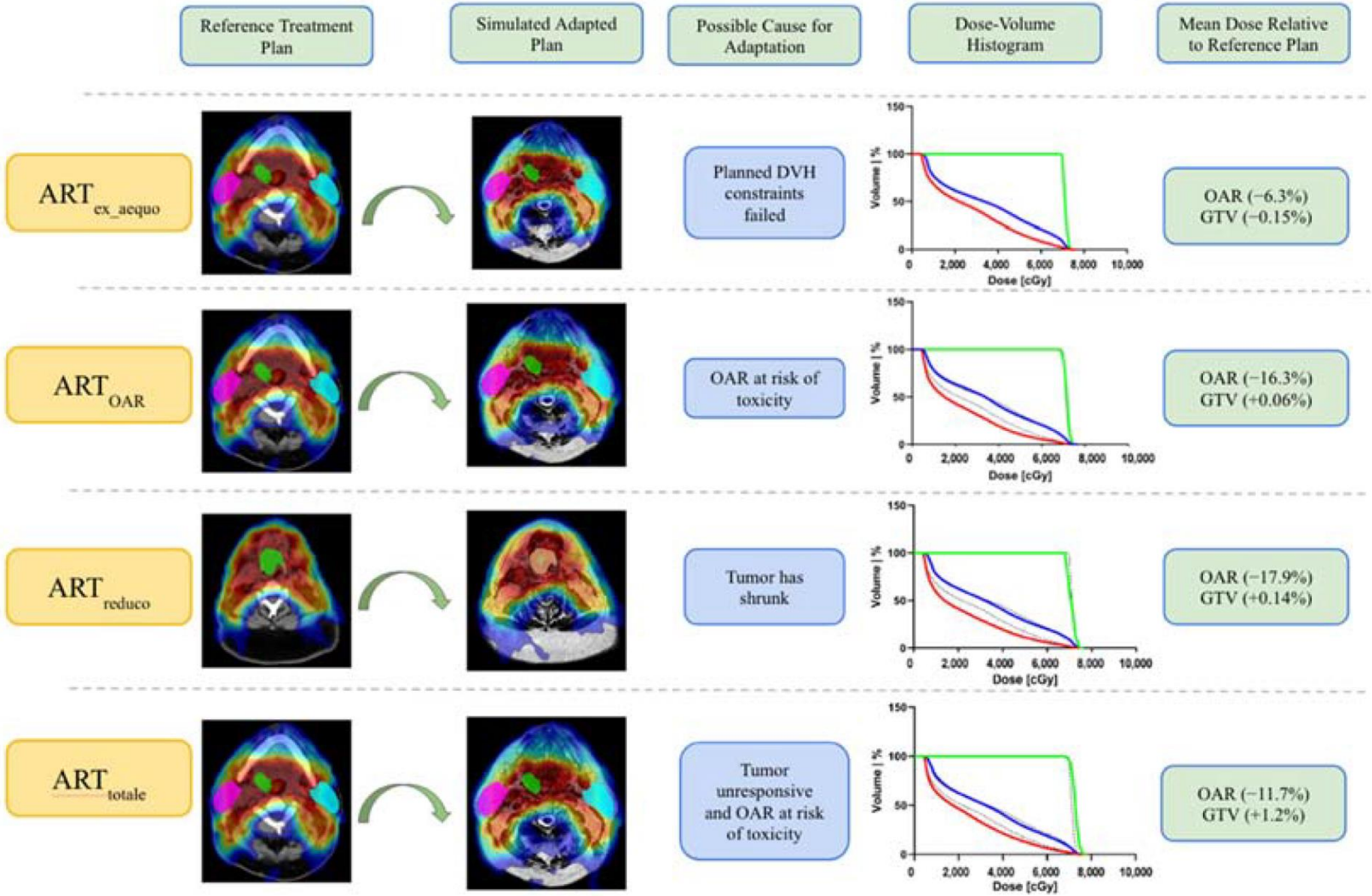
Hybrid 1.5T
MRI-**Li**near **Ac**celerator (MR-LinAc)



So, now we can see tumor before, during, and after treatment, both anatomically and functionally.



Adaptive NTCP analysis



The first SA of the parent grant (1R01CA257814-0) proposes mid-therapy re-optimization of the treatment plan based on the tumor response and predicted trajectory of the normal tissue injury. This requires frequent segmentation of the tumor by the physicians at a higher frequency as well as higher computational resources,

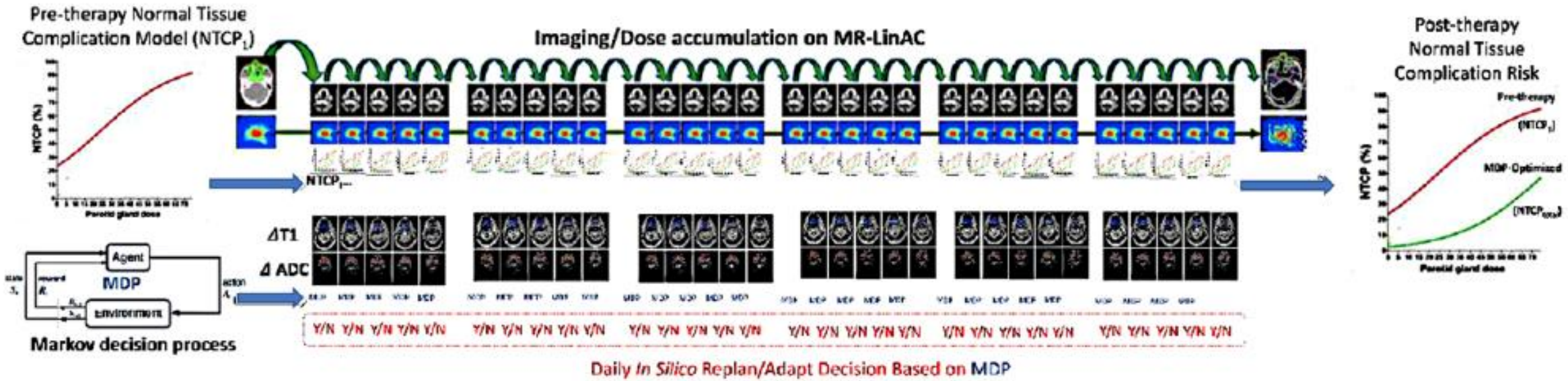


Figure 1: Graphical of the parent award, showing serial daily imaging and NTCP-based ART modeling.

Included datasets

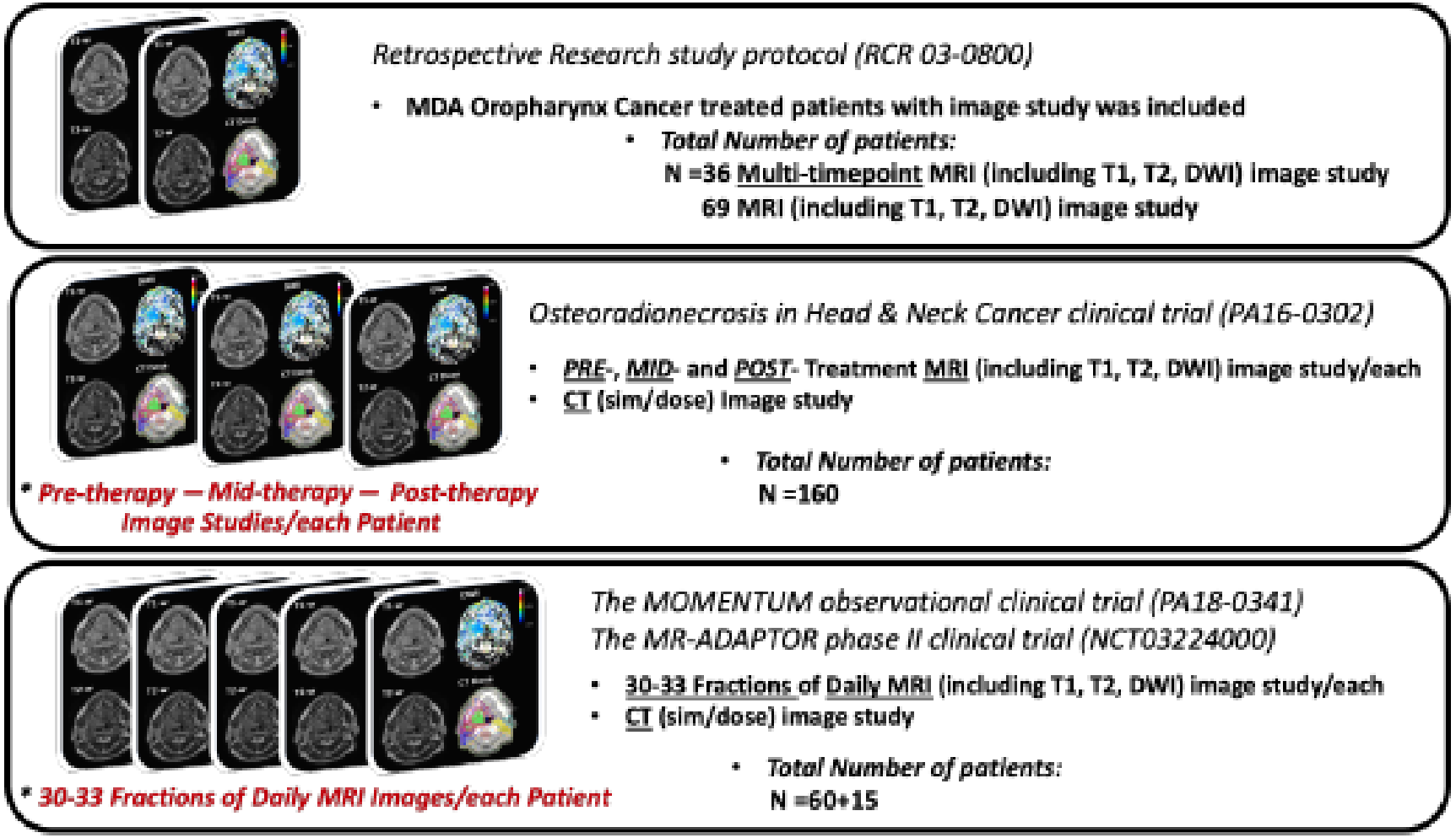


Figure 2a: Primary data sources to be support the specific aims of the proposed efforts

SA 1: Data Curation

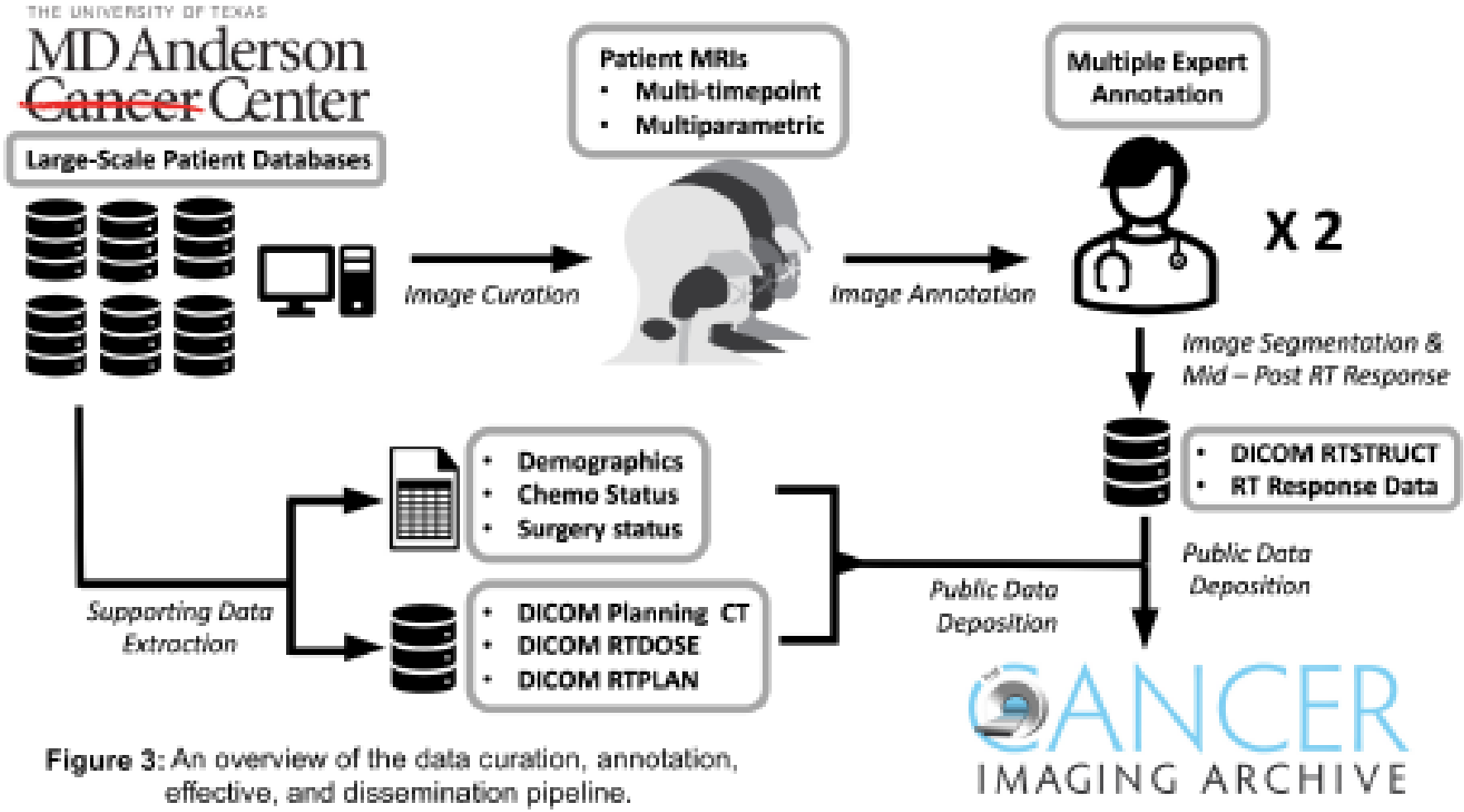


Figure 3: An overview of the data curation, annotation, effective, and dissemination pipeline.

SA1 Important Milestones

- Dataset proposal has been officially accepted by The Cancer Imaging Archive (**TCIA**).
- Biweekly ongoing discussions with TCIA administrators are setting the stage for our eventual data submission.

Need for MR-guided data challenges in HNC

- MRI-guided approaches becoming increasingly crucial for HNC RT treatment planning.
  - Allow for increased soft tissue contrast/resolution and functional imaging.
- To-date, no large publicly available AI-ready MR-guided datasets for public algorithmic development.

MR-Linac = real-time imaging + treatment

Current Challenge Timeline

- Registration period: May 1 - June 15
- Release date of training cases: June 15
- Release date of test cases: August 15
- Participant submission dates: August 15 - September 15
- Paper abstract submission deadline: September 15
- Release date of results: September 20
- Full paper submission deadline: September 20.
- Live event: After October 10th (MICCAI)
- Deadline for final papers: November 1st.