

Introduction:

- **Cardiac radioablation** uses radiation to treat life-threatening ventricular tachycardia
- Treatment commonly uses the **Varian TrueBeam** (Varian Medical Systems, Palo Alto, CA, Figure 1)
- **Varian Halcyon** offers a high-throughput alternative, and **Varian Ethos** offers an AI-assisted alternative
- **Unmet need:** To validate Halcyon and Ethos for cardiac radioablation

Hypothesis: Halcyon and Ethos can be used in the clinic for cardiac radioablation.



Figure 1: TrueBeam, Halcyon, and Ethos treatment platforms. Adapted from cancercare.siemens-healthineers.com.

Purpose: To compare TrueBeam, Halcyon, and Ethos as treatment platforms for cardiac radioablation.

Methods:

- Radiation plans were created on each platform, with a **prescription dose of 25 Gy in one session**
- Two sets of radiation plans were generated on Ethos:
 - One with user-selected beam setup
 - One with system-selected beam setup
- Plans were evaluated for **conformity, R50, D_{2cm}, and beam-on time** (Figure 2)

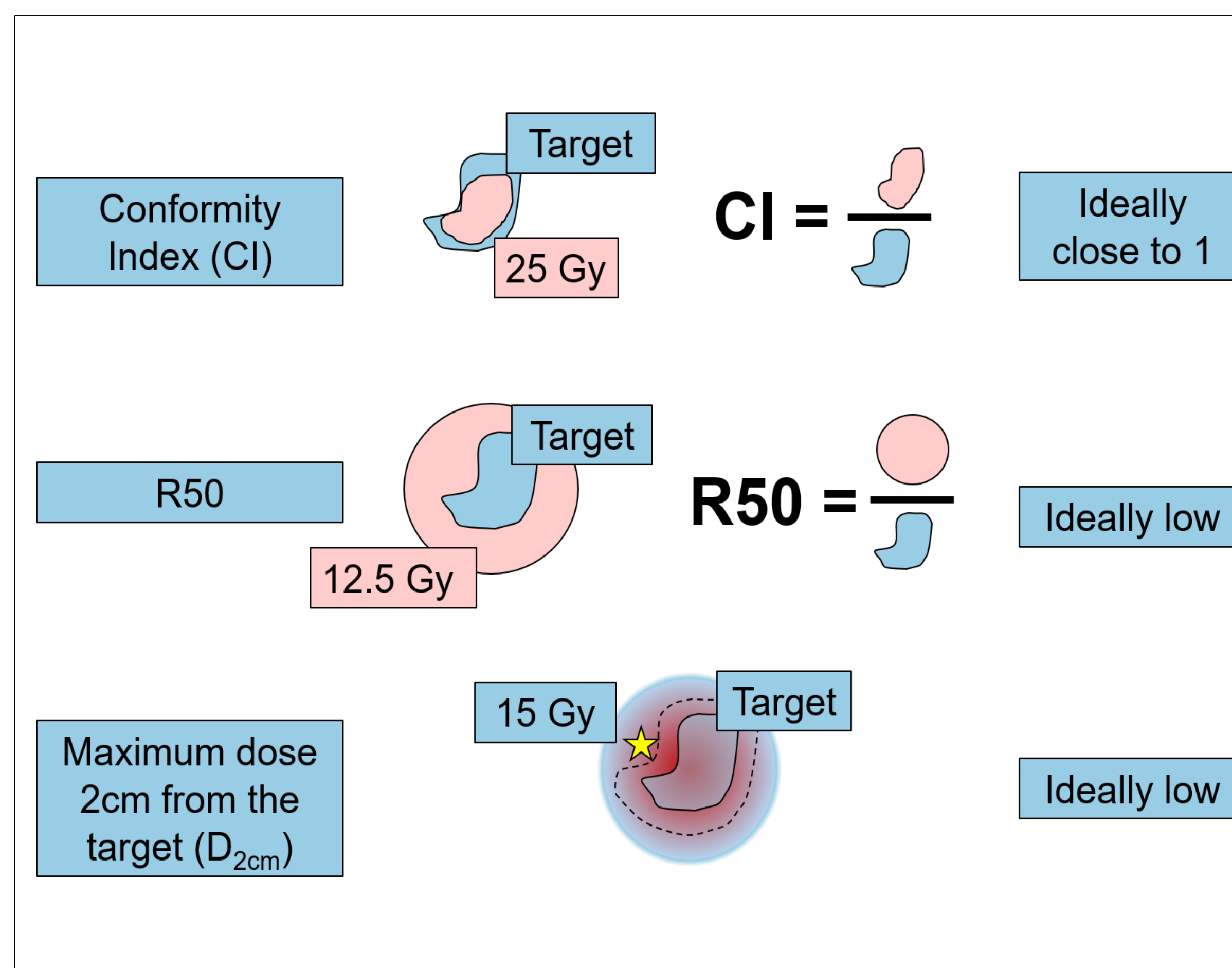


Figure 2: Metrics used for plan comparison.

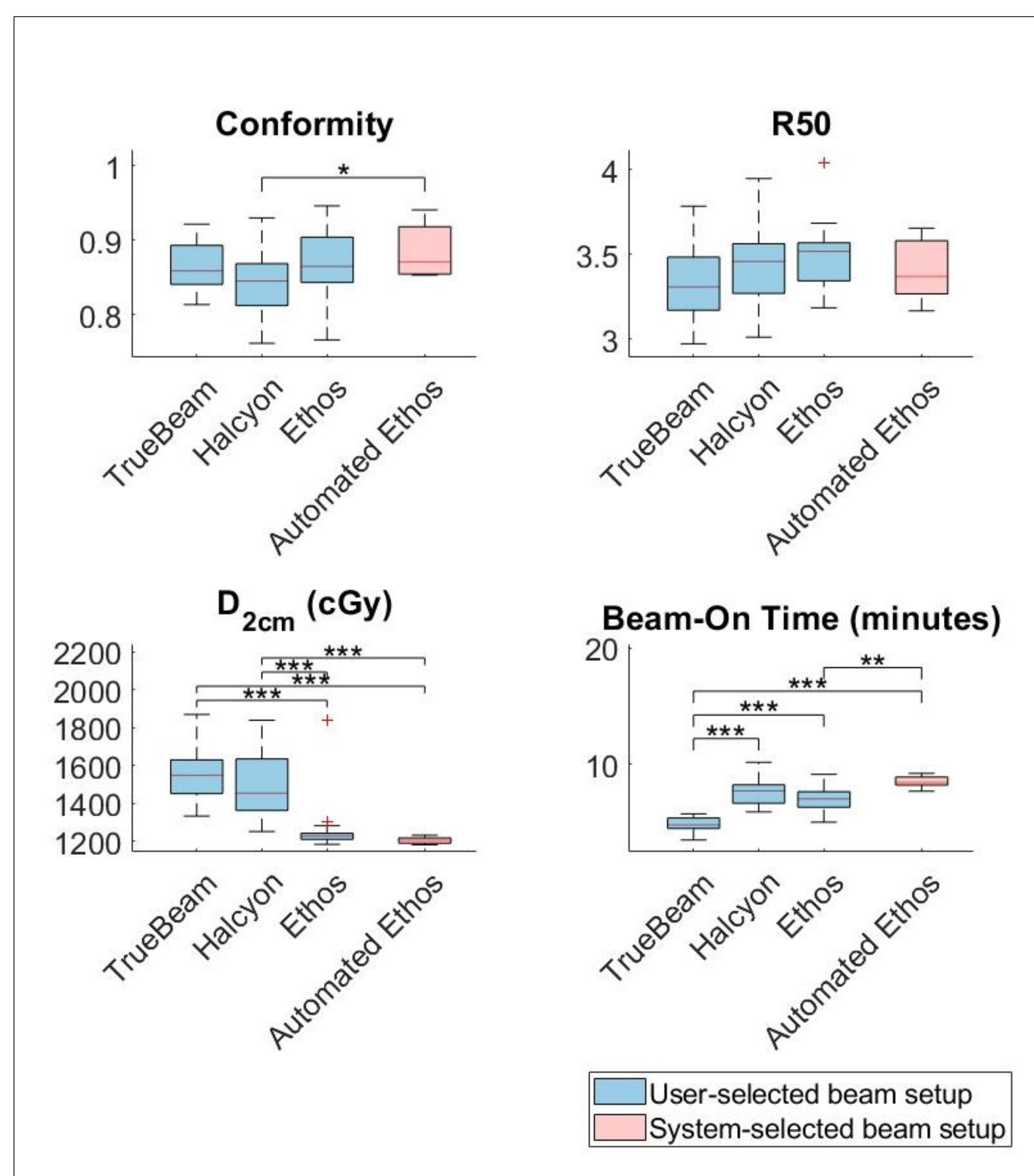


Figure 3: Plan parameters by platform type. *p<.05, **p<.01, ***p<.001.

Results:

- Most TrueBeam, Halcyon, and Ethos plans demonstrate **similar conformity and R50** (Figure 3)
- Ethos plans demonstrate **significantly lower D_{2cm}** than TrueBeam and Halcyon plans
- **Beam-on time is significantly lower** for TrueBeam plans than for Halcyon and Ethos plans
- All metrics for all plans are within an acceptable range

Discussion and Key Takeaways:

- Results demonstrate a **trade-off between delivery efficiency (TrueBeam) and dosimetric sparing (Ethos)**
- Shorter beam-on times with TrueBeam may offer advantages for **patient comfort**
- Ethos may provide **greater normal tissue sparing** than TrueBeam and Halcyon
- **No clear advantage** was observed between system- and user-selected beam setups for Ethos plans
- Further work will evaluate dose sparing for surrounding organs by treatment platform

Conclusion: This work supports the clinical adoption of Halcyon and Ethos for cardiac radioablation while highlighting platform-specific trade-offs in dose distribution and beam-on time.

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