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This study developed and commissioned a protocol for intracavitary HDR brachytherapy treatment in a murine cervical cancer model mimicking patient treatment procedures.

- 10 non-tumor bearing Female C57BL/6 Mice (18g-21g, 7-8 weeks old)
- Anesthetized: ketamine/xylazine cocktail + Isoflurane
- Affixed supine on Styrofoam boards
- Chemical based heating pads placed under mice

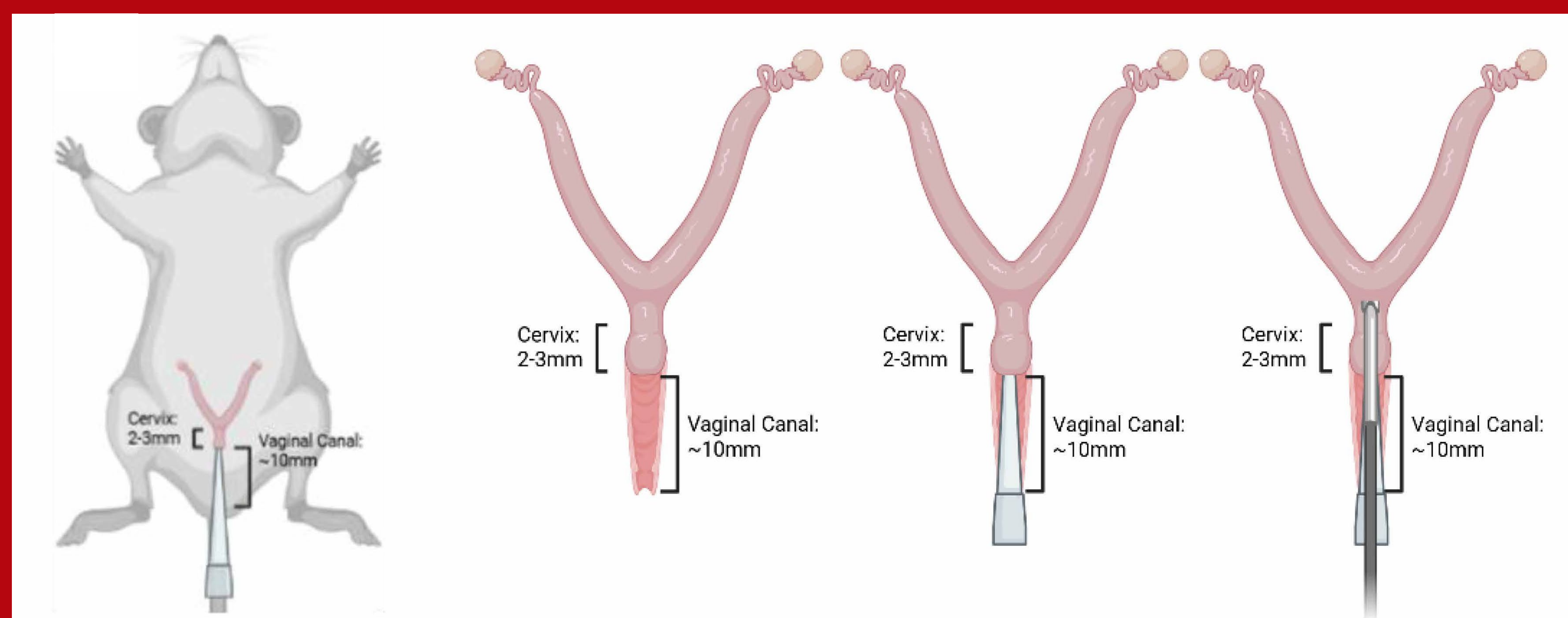
- Applicator Placement (17Ga Ti Needle, Varian)
- HDR Brachytherapy Irradiation – Bravos, Varian
 - Single dwell position 1 mm from end of applicator
 - Rx: 400 cGy at 0.5 cm laterally from source midline
- Large-Bore Simulation CT Scan (Siemens SOMATOM go.Open Pro)
 - Applicator Placement Verification
 - Retrospective Dose Analysis

- Varian BrachyVision Version 18.1
- TG-43 vs. Model Based Dose Calculation Algorithms (Acuros BV)
- CT Acquisition Energy
 - 120 kVp and 70 kVp
- CT Reconstruction Kernel
 - Body, Head, and Qualitative Kernels
 - Siemens Specific Kernels: Br56, Br44, Hr44, Or40

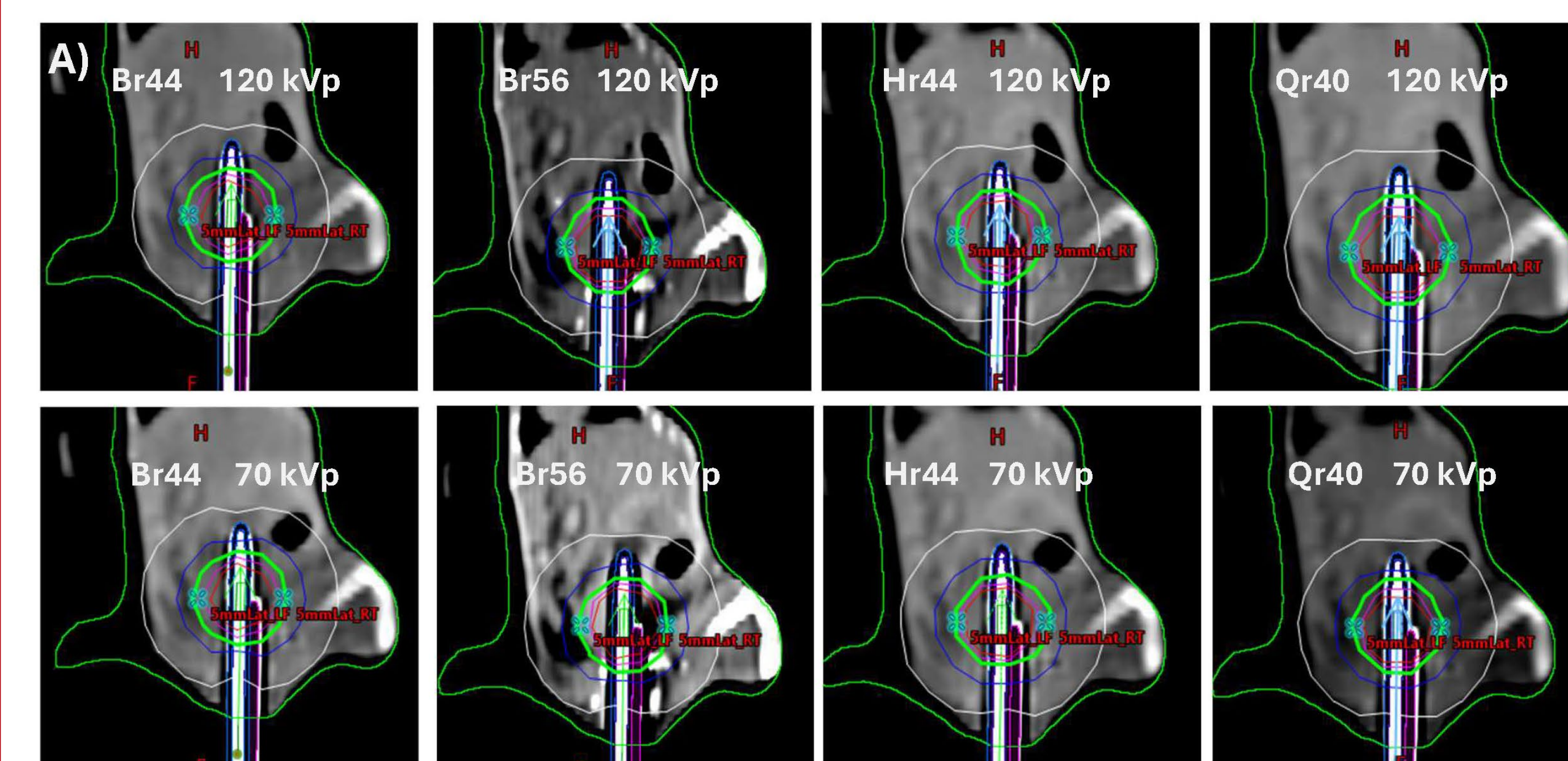
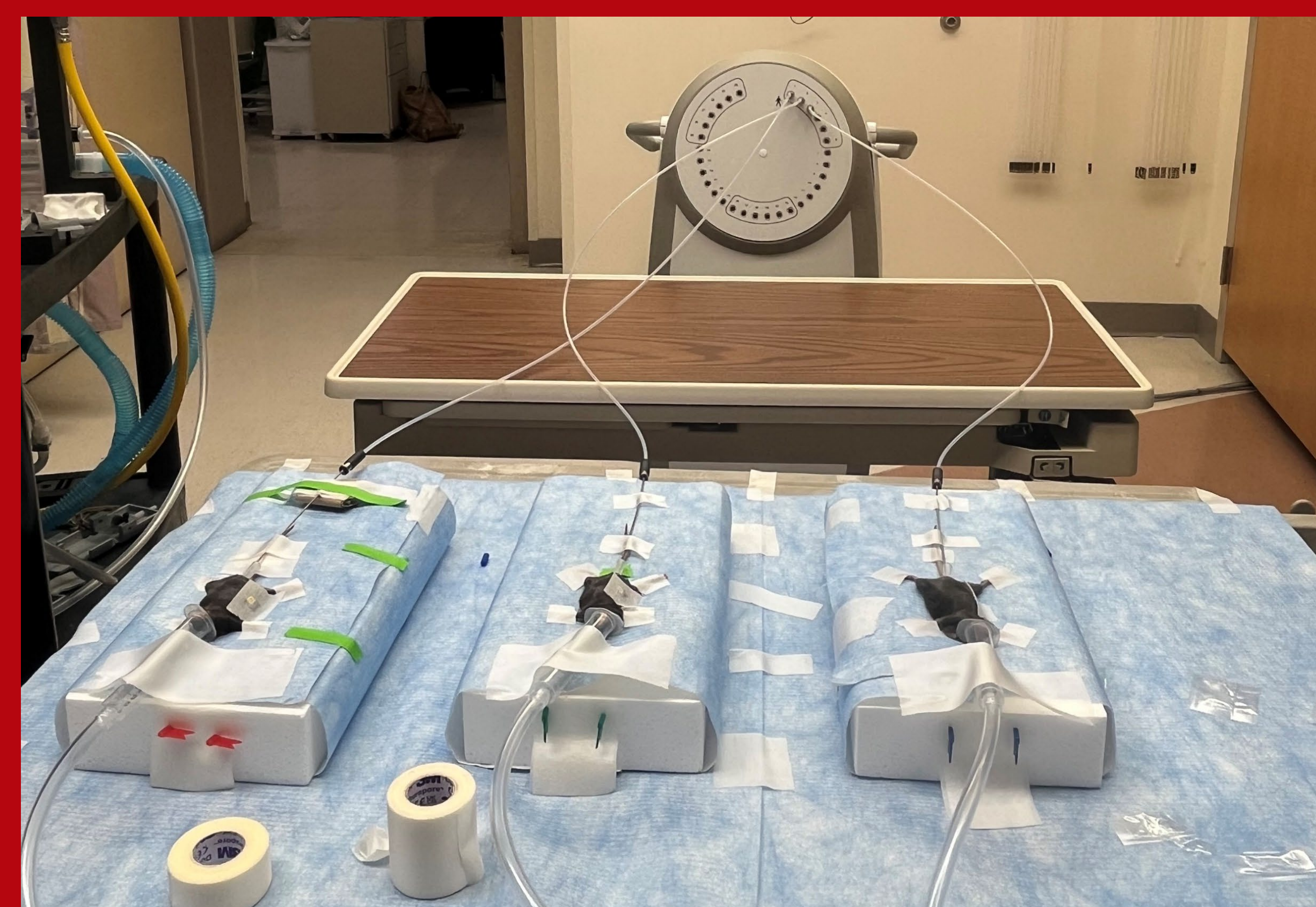
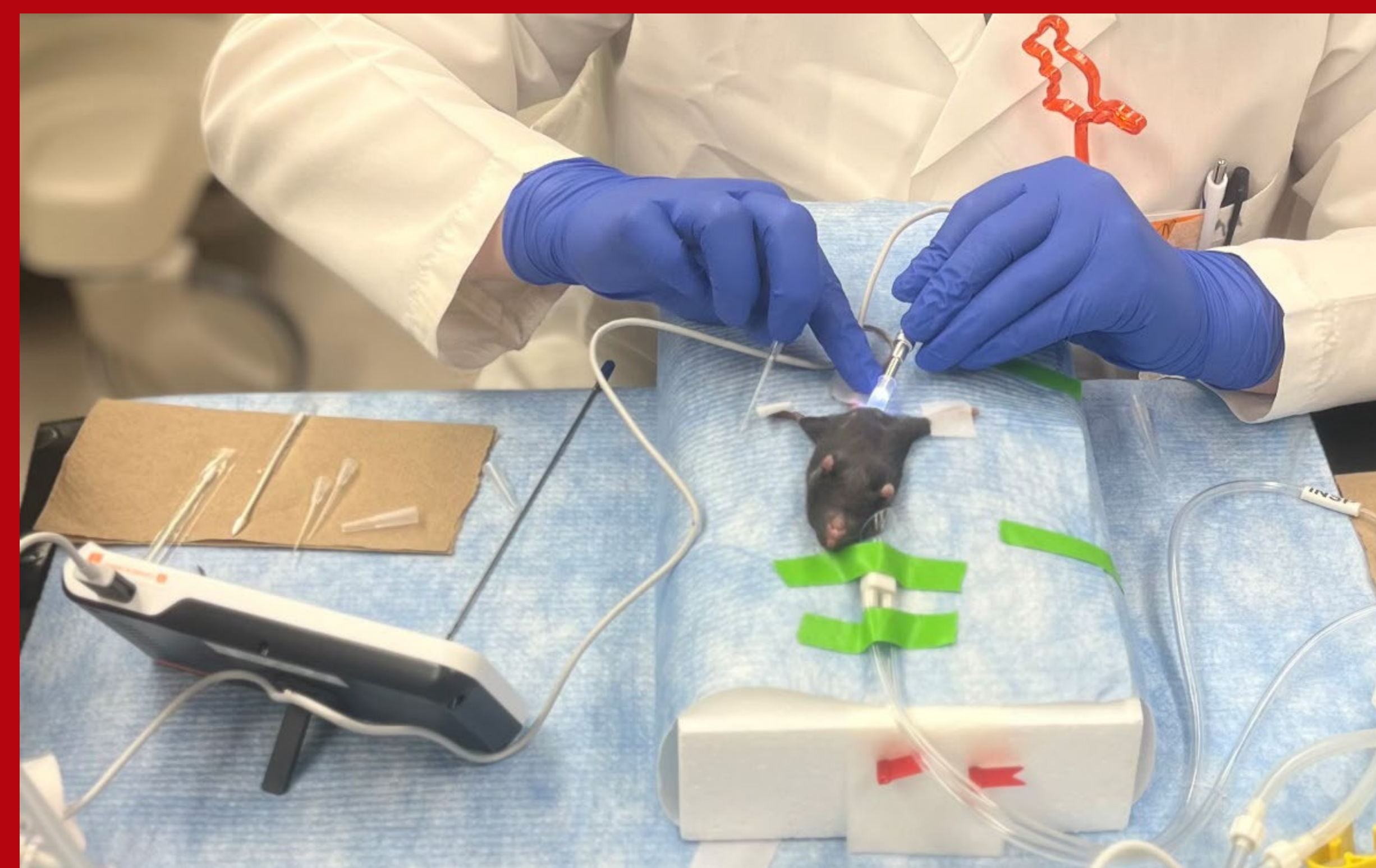
- 5.8% Difference in Calculation Models

- Mean Percent Difference (Standard Deviation): 3.4% (1.8%)

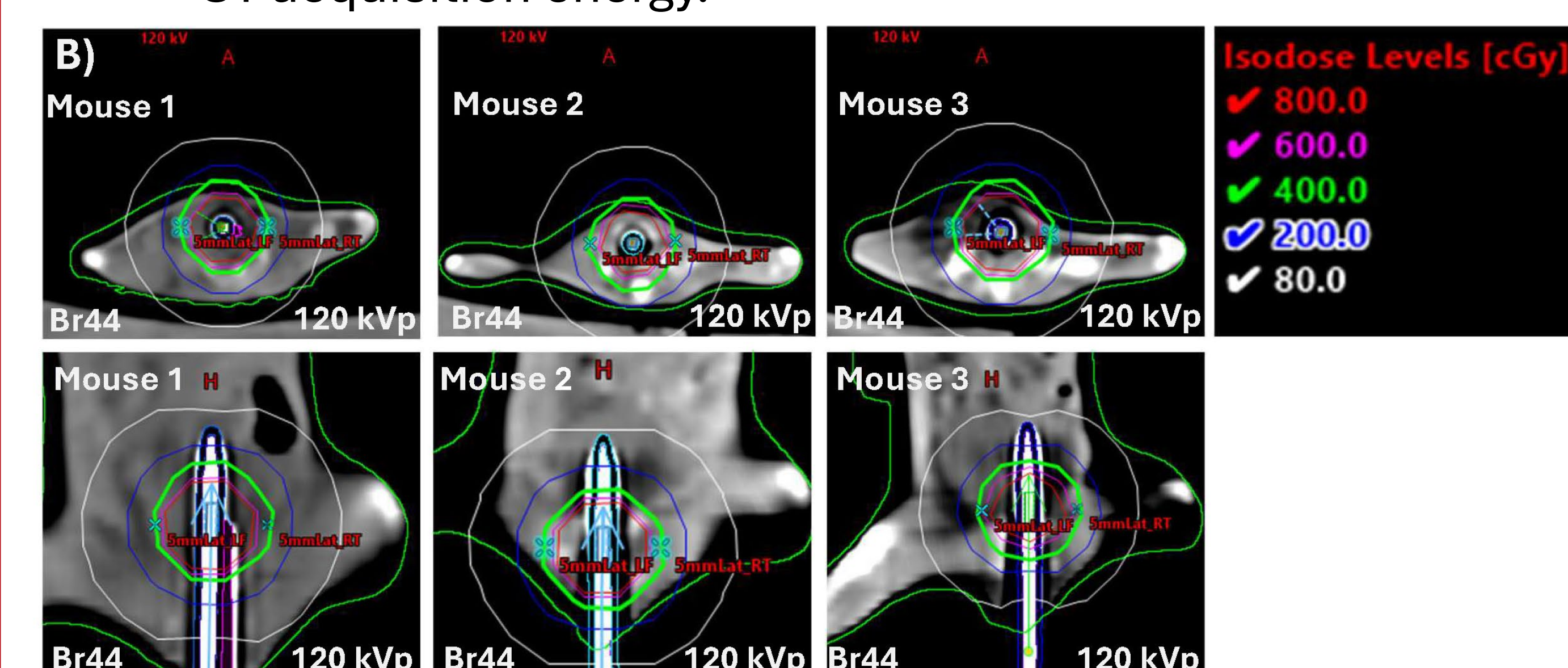
- CT reconstruction kernel and acquisition energy were found to have a minimal (<0.5%) impact on calculated dose



Depiction of brachytherapy needle insertion in relation to the mouse anatomy. The dead space of the needle is nested 1-2 mm past the 2-3 mm cervix zone. This places the source within a 1 mm range of the cervix in non-tumor bearing mice.



A. Identical plans showing the 400 cGy prescription dose 0.5 cm laterally from the source midline in the coronal plane compared between the Br44, Br56, Hr44, and Qr40 reconstruction kernels at both 120 kVp and 70 kVp CT acquisition energy.



B. Dosimetric comparison between a subset (n=3) of the 10 Brachytherapy treatment group mice. The prescription 400 cGy (green isodose line) is shown relative to the two reference points in the axial and coronal planes.

- Dose calculations employing heterogeneity corrections are recommended for optimal dosimetric accuracy
- Impact of CT beam energy and reconstruction kernel minimally impacts MBDC dose

- Experiments with tumor bearing mice
- Study immune response of mice treated with HDR brachytherapy

