

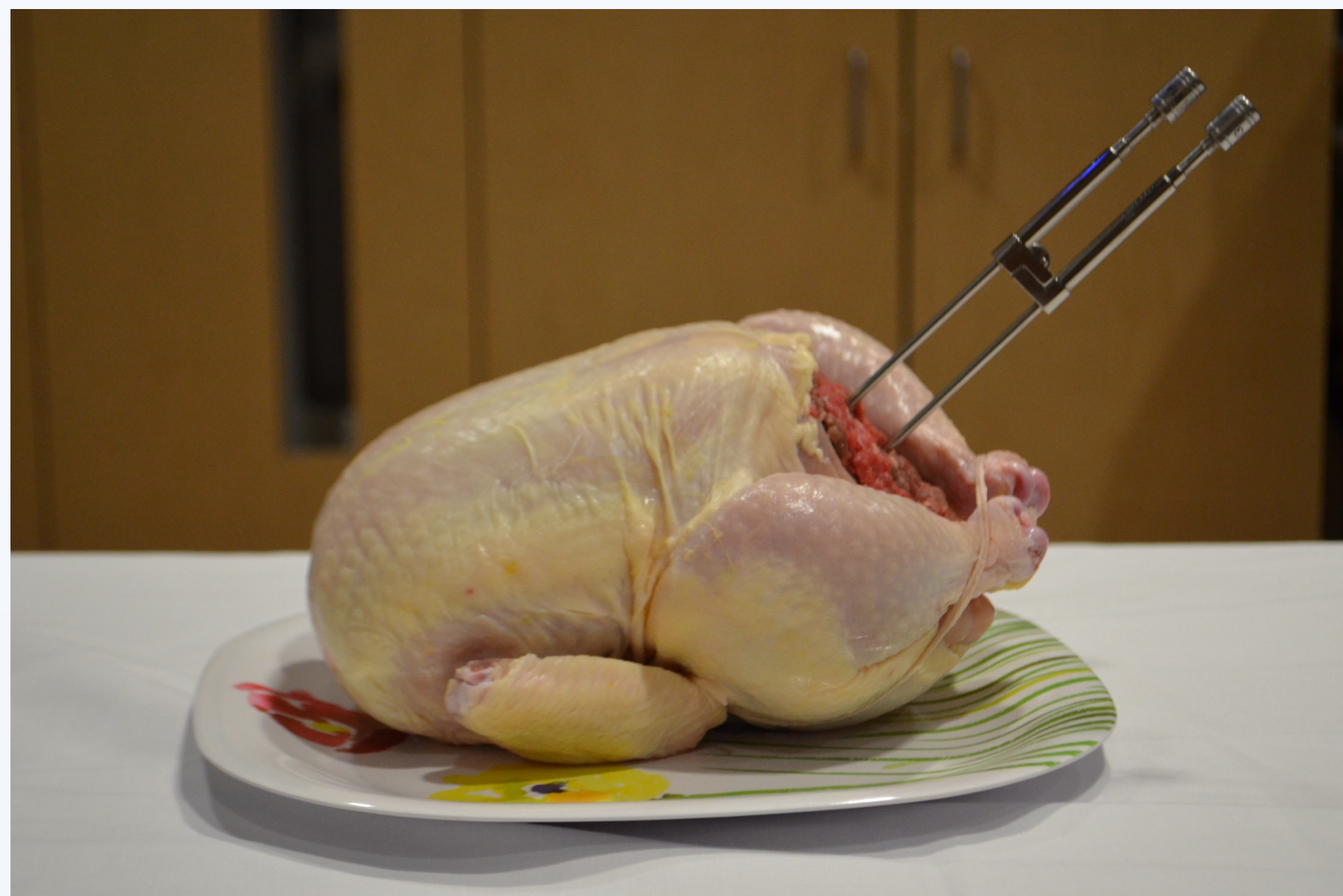
Economical Edible Phantoms for MRI Brachytherapy Imaging

Corinne Dallas, John Smith & Graham Gilson

Abbott Northwestern Hospital, Minneapolis MN

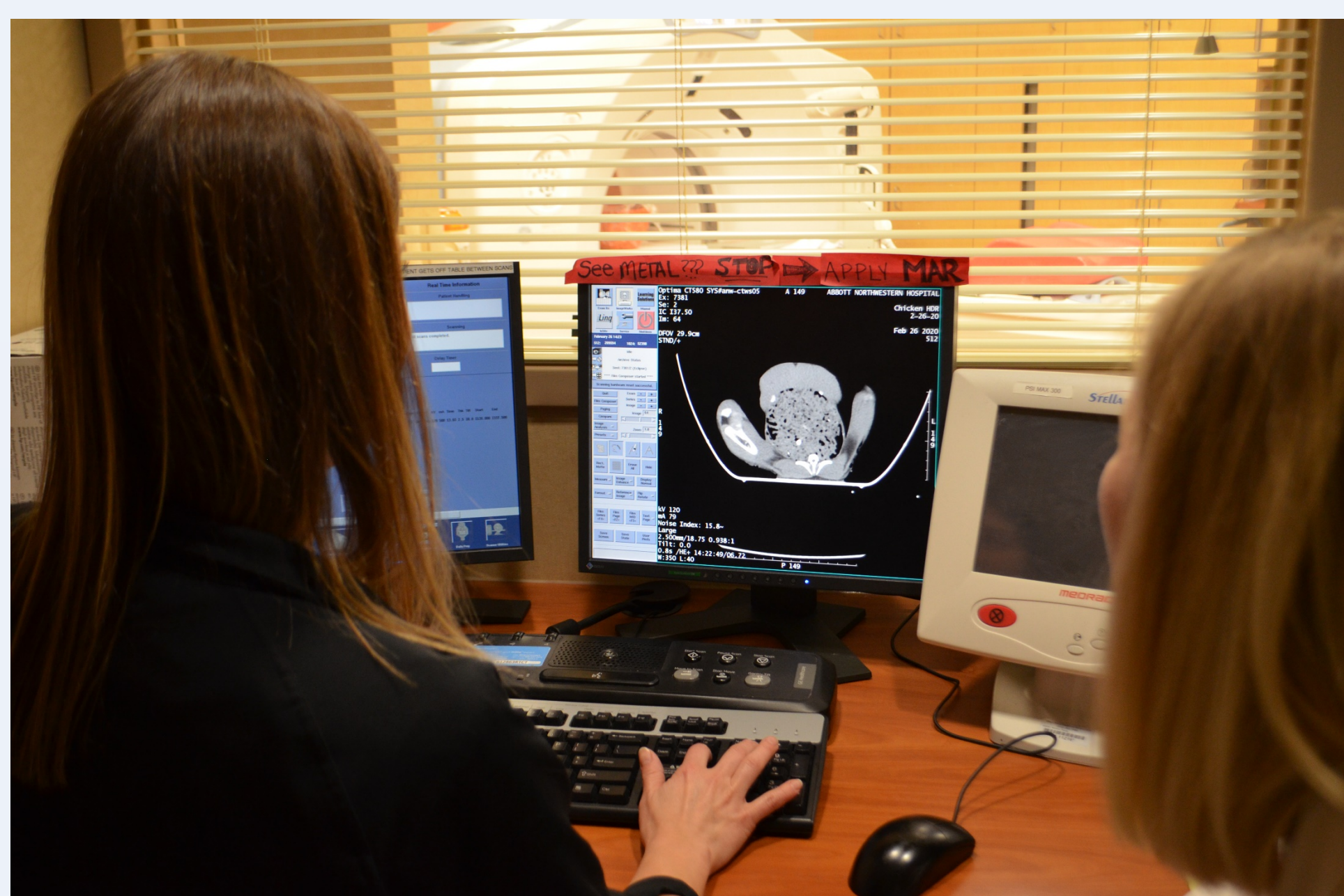
PURPOSE

MRI imaging techniques can be optimized for HDR cervical cancer brachytherapy by using a low cost edible tissue equivalent phantom. Grocery store whole chickens stuffed with raw hamburger meat are excellent phantoms to used with HDR Tandem and Ring Kits and MRI markers.



OBJECTIVES

- Optimize MRI Imaging
- QA MRI Markers
- QA HDR Tandem and Ring Applicators



MATERIALS AND METHODS

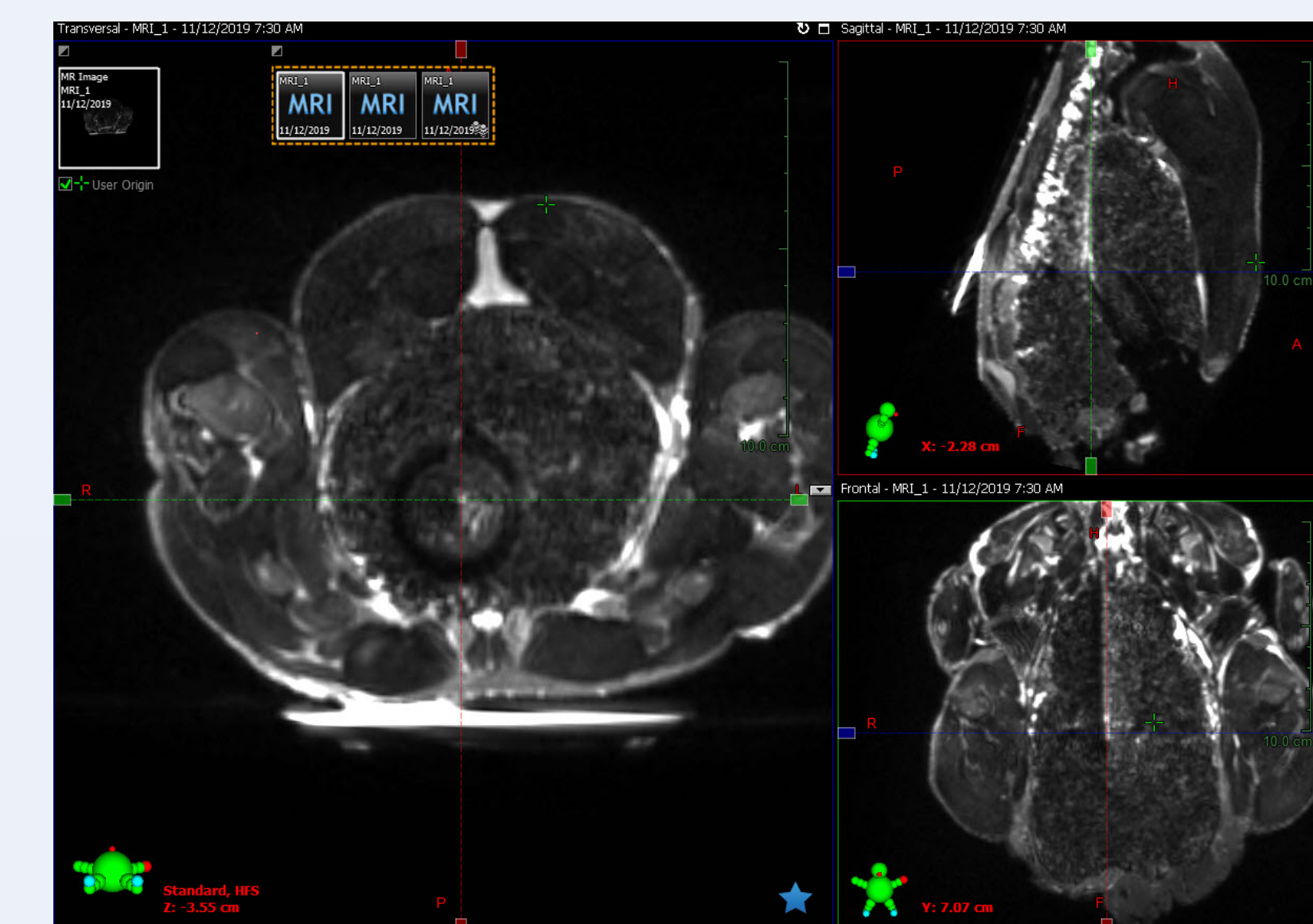
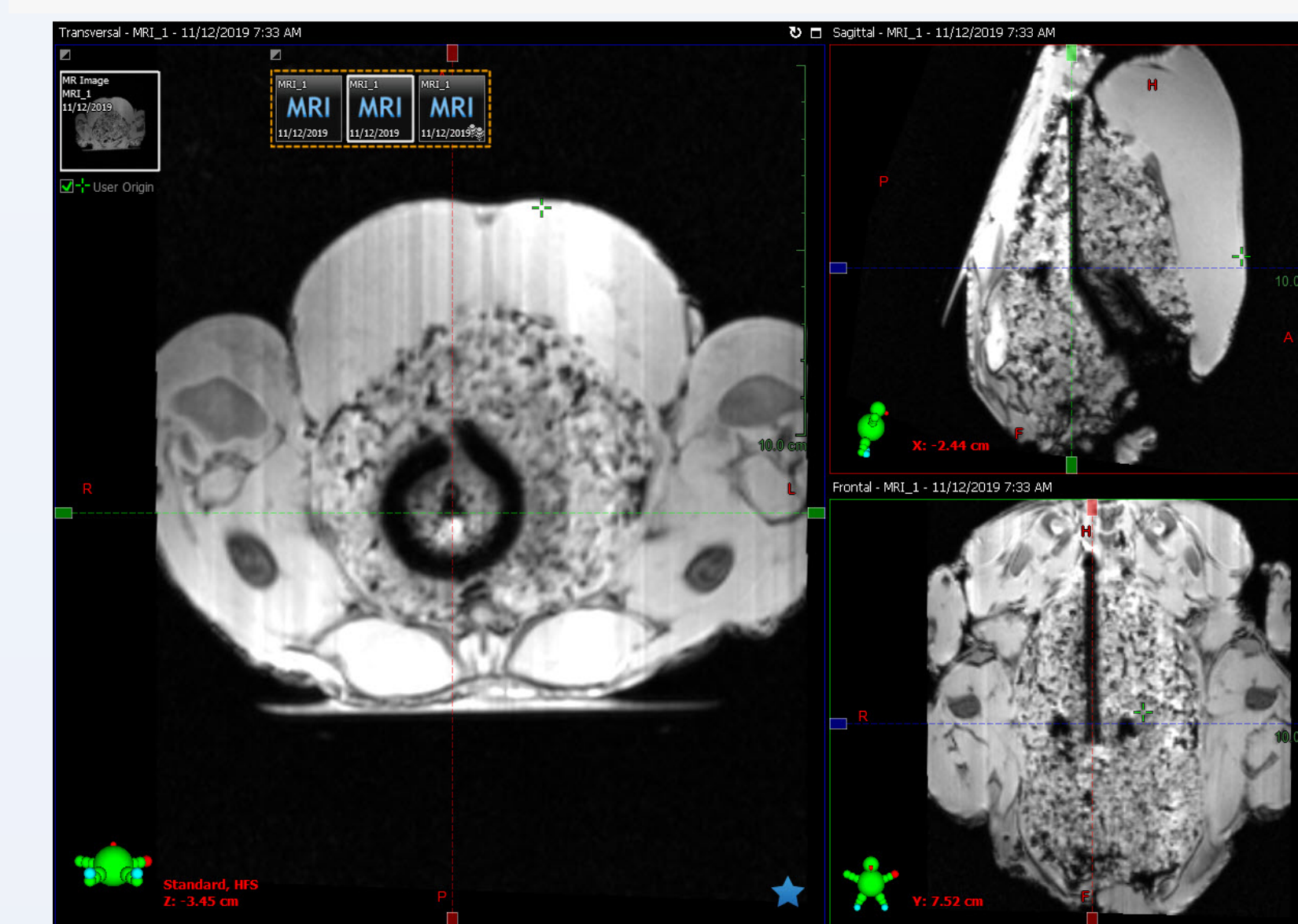
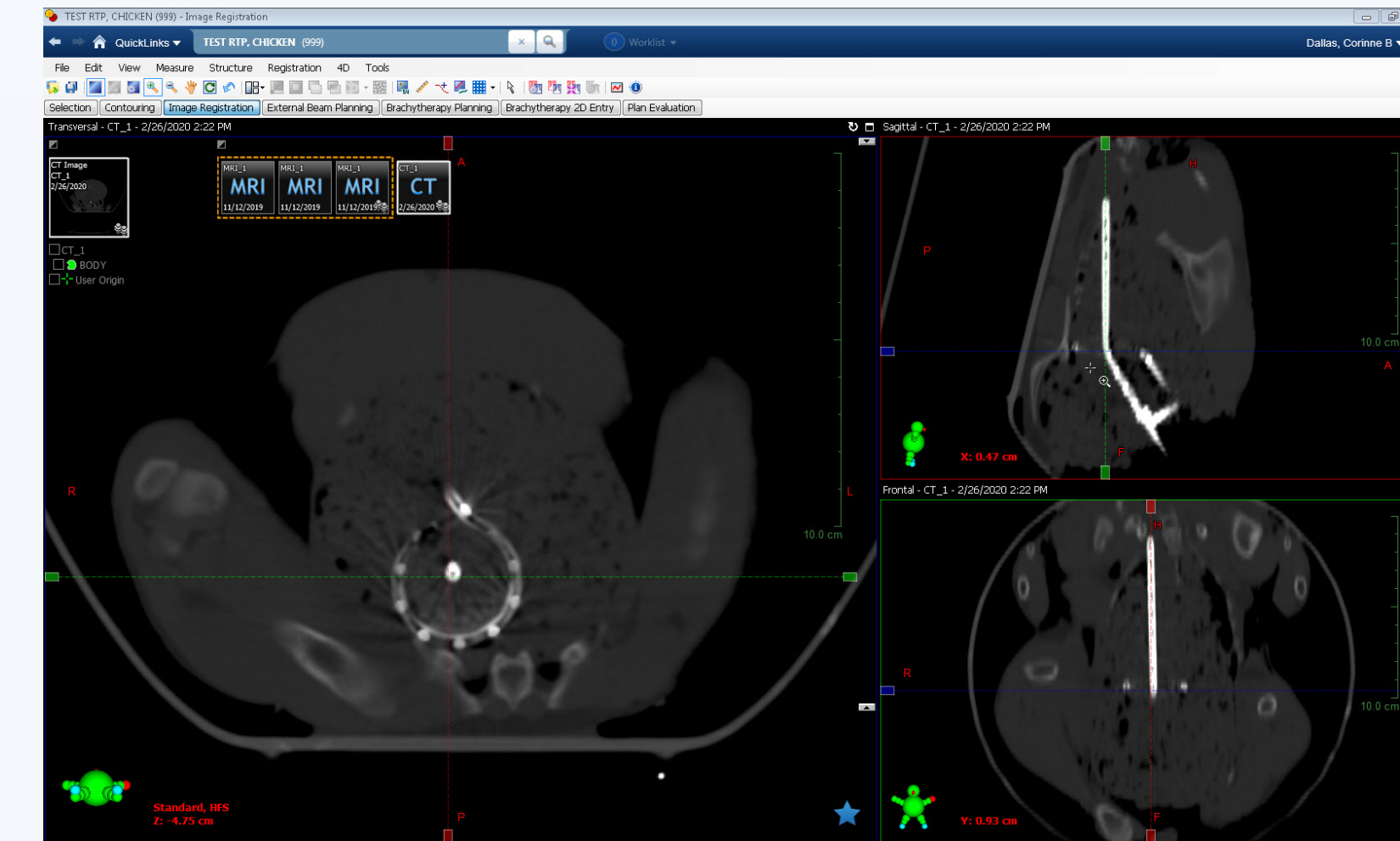
- HDR Tandem and Ring Applicator kits
 - Elekta Kit (plastic)
 - Mick Radio-Nuclear Kit (titanium)
- Phantom
 - Whole Chicken
 - Hamburger Meat
 - Plastic Bowl
 - Plastic food wrap
- MR markers
 - Orion HDR Lumen Marker filled with sealed high-density polyethylene tube containing cobalt chloride: N-Acetylcysteine saline solution for Ring Marker
 - Elekta HDR tandem marker filled with water/iodine
- CT markers
 - IU3 and R1



A whole chicken was filled with raw hamburger meat. The CT markers were inserted into the HDR applicators and the applicators were inserted into the chicken cavity filled with hamburger. The phantom with the applicators were placed in a plastic bowl and covered with plastic food wrap. A CT was performed to verify applicator placement in the phantom. MRI markers were placed in the applicator and the chicken phantom was brought over to our 1.5 T Siemens MRI Scanner. For the best Signal-to-Noise Ratio, a Pelvis MRI Coil was placed on top of the bowl. T2 SPACE and T1 MPRAGE image sequences were optimized to see the contrast of the MRI marker in the phantom.

RESULTS

The chicken was a successful tissue equivalent phantom for MRI imaging and was able to show marker contrast in the applicators. We were able to optimize MRI images techniques specifically for our HDR applicators and MRI scanner.



CONCLUSIONS

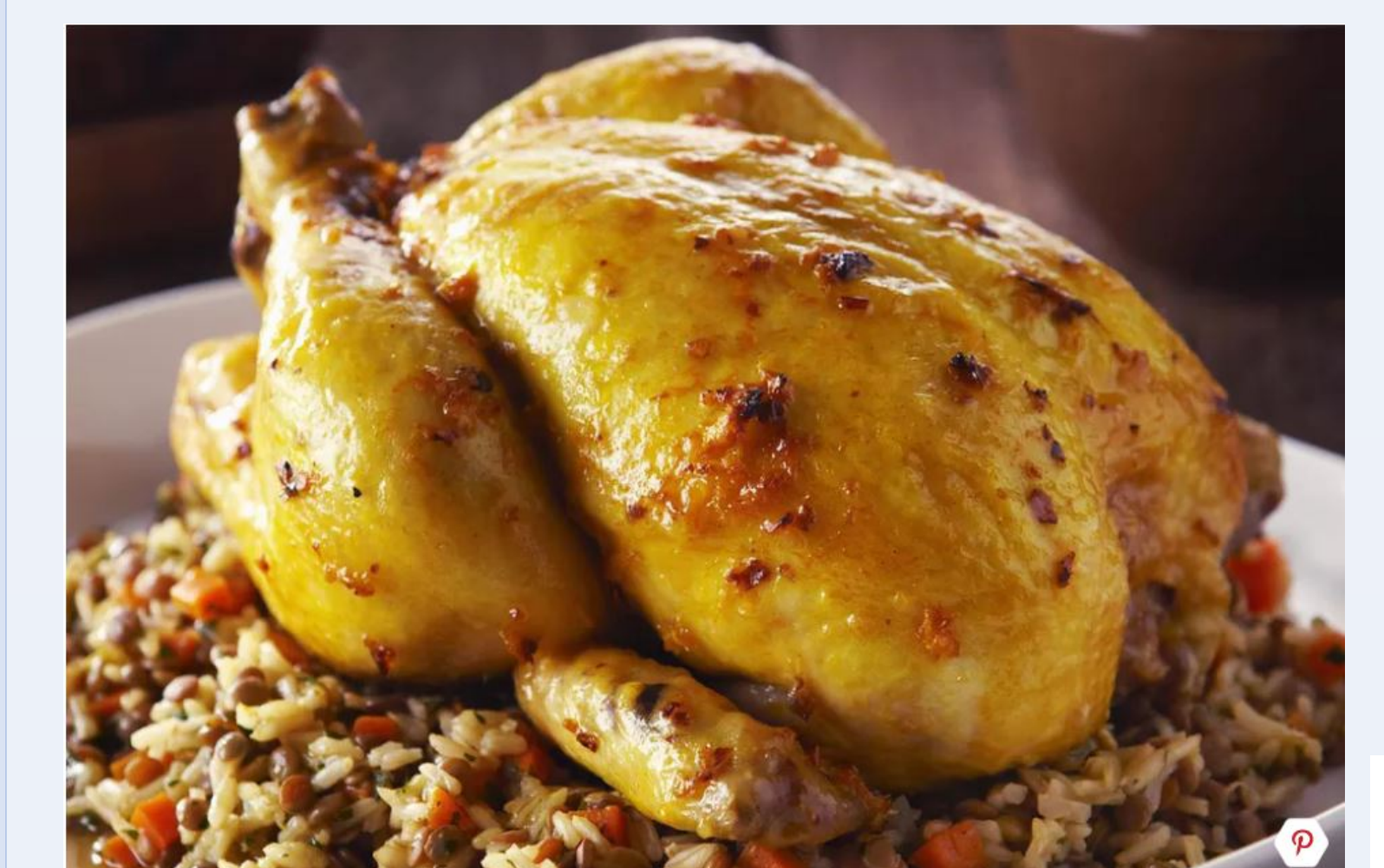
The chicken phantom is perfect for optimizing brachytherapy MRI imaging techniques. We are working on a vegetarian alternative phantom. The next chicken frontier will be to use the chicken phantom for End to End brachytherapy testing.



REFERENCES

MRI Imaging based on techniques from:

- Orion HDR MRI Lumen Marker Technical User Guide
 - For T1 MPRAGE and T2 space
- Medical Physics October 2019 Vol 46 Issue 10: Automatic tandem and ring reconstruction using MRI for cervical cancer brachytherapy; William Hrinivich, Marc Morcos, Akila Viswanathan and Junghoon Lee, John Hopkins University
 - For T2-weighted fast spin echo images (T2 SPACE)



CONTACT

Corinne.Dallas@allina.com

