

## Using Visicoil MR Fiducial Markers for IGRT Fiducial Tracking

Jing Feng<sup>1</sup>, Jun Yang<sup>2</sup>, Liang Xing<sup>2</sup>, Andrew J. Cardin<sup>3</sup>, Kevin Reynolds<sup>4</sup>, Richard Brancalone<sup>4</sup>

1. Philadelphia Cyberknife, Philadelphia Cyberknife 2. Philadelphia Cyberknife, Philadelphia CyberKnife  
3. Radiation Physics Solutions, LLC 4. Oncology, Iba/radiomed

✉ **Corresponding author:** Jing Feng, fengjing@gmail.com

**Categories:** Medical Physics, Radiation Oncology

**Keywords:** sbrt, stereotactic body radiotherapy, fiducial marker, mri

### How to cite this abstract

Feng J, Yang J, Xing L, et al. (November 02, 2017) Using Visicoil MR Fiducial Markers for IGRT Fiducial Tracking. Cureus 9(11): a278

## Abstract

**Objectives:** Tracking fiducial markers is a direct method of tumor localization in IGRT. The NEW Visicoil MR Platinum fiducial markers can be inserted using narrow needle (Gauges 19, 21 & 22) with less morbidity. We explored the feasibility of using Visicoil MR fiducial markers for IGRT.

**Methods:** The Visicoil MR Platinum fiducial markers used in this tested are:

- 0.35 mm Diameter x 1.0 cm Length (22g Needle)
- 0.50 mm Diameter x 0.5 cm Length (21g Needle)
- 0.75 mm Diameter x 0.5 cm Length (19g Needle)

For Visicoil MR 0.35mm x 1.0 cm, the varied pitch of the very thin coil allows it to 'fold up' consistently into a ball shape when injected; which mitigates the possibility of fiducial migration. In our study, Visicoil MR 0.35 mm x 1.0 cm, Visicoil MR 0.50 mm x 0.5 cm, and Visicoil MR 0.75 mm x 0.5 cm were inserted into a phantom material along with two standard cylindrical gold fiducial markers (1.17 mm x 0.3 cm and 1.17 mm x 0.5 cm). The phantom was scanned by different MRI units (Siemens, GE and Philips) each using a variety of MRI sequences.

**Results:** All fiducial markers are clearly visible on MRI series. The fiducials were most clearly visible by a different pulse sequence for each MRI machine. All markers are clearly visible with CyberKnife kilo-voltage imaging devices. In our CyberKnife test, Visicoil MR fiducial markers were visible under default X-ray parameters. The precision of the lock-on is within 1 mm.

**Conclusions:** The Visicoil MR fiducial markers appear comparable with standard cylindrical gold fiducial markers for the purpose of CyberKnife tracking while being offered in much smaller gauge needles. Visicoil fiducial markers exhibit fewer artifacts on both CT and MRI. Their visibility on MRI scans should be optimized for different MRI manufacturers.

### Open Access

#### Abstract

Published 11/02/2017

#### Copyright

© Copyright 2017

Feng et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 3.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Distributed under

Creative Commons CC-BY 3.0