Screening of Patients with Haircare Products for Magnetic Resonance Imaging

Wingchi Edmund Kwok, PhD, Laurie Mancarella, RT
Department of Imaging Sciences, University of Rochester Medical Center, Rochester, NY, USA

BACKGROUND

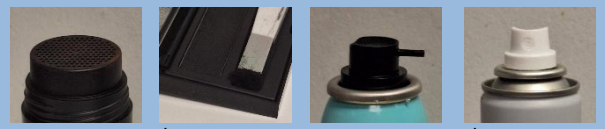
- Haircare products may contain ferromagnetic materials that can cause MR image artifacts [1-3].
- Besides, some are in powder form that may be attracted into the MRI machine, leading to scanning interruption, the need to clean up and magnetic field inhomogeneity if the product is not properly removed.
- This study aims to explore the use of handheld ferromagnetic detector (FMD) and handheld magnet in the screening of patients with haircare products for MRI.

METHOD

- Four haircare products, all being root cover up, were studied.
- Each product was in powder form & was spread on a gauze in similar fashion as on human scalp.
- A handheld FMD and a small handheld magnet were used to test each product for ferromagnetism.
- Moreover, each product was put inside a zip plastic bag, placed on top of a 13-cm MRI phantom and scanned with a susceptibility-weighted gradient-echo sequence for image artifact evaluation.
- Each product (inside a plastic bag) was also brought to the entrance of the MRI magnet to check for any powder movement under the magnetic field.



When a patient with root cover up on her head was wheeled toward an MRI magnet, the root cover up powder flew towards the magnet and landed on the RF coil. The patient was immediately pulled out of the scan room. The powder was later cleaned up by the MRI system local field engineer.



a b c d

The root cover up products studied were in the form of (a) shaked powder, (b) brushed powder and (c,d) sprayed powder.



a b

These products were tested using (a) hand-held FMD and (b) hand-held magnet (circle) as well as phantom MR imaging.

RESULTS

- 3 haircare product set off the handheld FMD (see Table below).
- 2 product powder was attracted by & flew to the handheld magnet.
- One product (2 color tested) was not detected by the handheld FMD nor the handheld magnet.
- The powder of 2 products moved inside the plastic bag when brought near the MRI magnet, but not the other 2 products. One sprayed powder appeared to be sticking together & thus did not show movement.
- These results were consistent with the phantom MR imaging tests in which 3 products caused significant image artifact (signal void) while one product did not exhibit any artifact.

	Product 1	Product 2	Product 3	Product 4
Form	Shaked Powder	Brushed Powder	Sprayed Powder	Sprayed Powder
Color	Black & Auburn	Black	Dark Brown	Dark Brown
Image Artifacts?	 No	 Yes	 Yes	 Yes
Powder Movement near MRI?	No	Yes	No	Yes, when dry
Detected by handheld FMD?	No	Yes, < 1cm away	Yes, < 1cm away	Yes, < 1cm away
Detected by handheld magnet?	No	Yes	No	Yes, when dry

CONCLUSION

- This study demonstrates that handheld FMD or strong handheld magnet can be used in the screening of haircare products, distinguishing ferromagnetic from non-ferromagnetic ones.
- For handheld FMD, it may need to be positioned close to the haircare product to enable detection (within 1cm in this study).
- In some situation, a small handheld magnet may be easier to use, e.g. near hard-to-reach region.
- Effective screening of patients with haircare products before MRI may help prevent image artifacts from ferromagnetic products while avoiding necessary delay of MRI for patients with non-ferromagnetic products.

REFERENCES

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Author Contact information:
edmund_kwok@urmc.rochester.edu