

## A Novel MR Angiography Technique

Tech ID: 24947 / UC Case 2014-898-0

### SUMMARY

UCLA researchers in the Department of Radiology have demonstrated the FDA approved compound ferumoxytol (a.k.a Feraheme) as a safer and more efficient contrast agent in MRI imaging compared to the traditionally used contrast agent gadolinium. This compound is especially suited for use in pediatric patients with kidney failure.

### BACKGROUND

Contrast-enhanced magnetic resonance angiography (CE-MRA) through MRI imaging is used in evaluating patients with cardiovascular disorders and is preferred over other imaging modalities that require ionizing radiation, invasive catheterization, or dangerous chemicals. Detailed analysis provided by CE-MRA is crucial for surgical planning and interventions. Gadolinium is widely used as a contrast agent in CE-MRA; however, it has many disadvantages, including low stability, requiring patients to hold their breath, and a risk of kidney damage. These disadvantages make the use of gadolinium particularly difficult for use in pediatric patients and those with kidney complications. New contrast agents with higher stability and safety are greatly needed for improved medical imaging.

### INNOVATION

Dr. Paul Finn and colleagues in the Department of Radiology at UCLA has successfully applied the FDA approved iron supplement ferumoxytol as a contrast agent in pediatric patients with various health complications. Compared to gadolinium, using ferumoxytol allows for image acquisition over greater lengths of time, does not require patients to be anesthetized or ventilated, and has a greater contrast-to-noise ratio.

### APPLICATIONS

Ferumoxytol can be used as an alternative to gadolinium as a contrast agent in medical imaging with MRIs, and is particularly useful in pediatric patients with renal failure

### ADVANTAGES

- ▶ Ferumoxytol is an FDA approved agent
- ▶ Compared to gadolinium-based contrast agents, ferumoxytol carriers pose no added risk of kidney failure
- ▶ Ferumoxytol has a higher stability and longer half-life in the blood, allowing for more time to acquire images
- ▶ This method does not require patients to hold breath, making imaging in pediatric patients more feasible

### STATE OF DEVELOPMENT

Imaging using ferumoxytol has been successfully performed on a cohort of patients ranging from 6 days to 14 years of age and with various health complications. In the same patients, “first pass” imaging with Magnevist was performed for comparison. Overall, ferumoxytol improved the contrast-to-noise ratio in imaging and proved to be safe in pediatric patients with renal failure. The technology is undergoing further development to broaden the scope and applicability of the invention.

### PATENT STATUS

Country	Type	Number	Dated	Case
Germany	Issued Patent	60 2015 079 944.5	07/20/2022	2014-898

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### INVENTORS

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### OTHER INFORMATION

#### KEYWORDS

medical imaging, contrast-agent, MRI, cardiovascular, pediatrics, renal failure, children, chronic kidney disease, ferumoxytol, vascular imaging

#### CATEGORIZED AS

- ▶ **Imaging**
  - ▶ 3D/Immersive
  - ▶ Other
- ▶ **Materials & Chemicals**
  - ▶ Other

#### RELATED CASES

2014-898-0

France	Issued Patent	3139833	07/20/2022	2014-898
United Kingdom	Issued Patent	3139833	07/20/2022	2014-898
Italy	Issued Patent	502022000063762	07/20/2022	2014-898
Sweden	Issued Patent	3139833	07/20/2022	2014-898
United States Of America	Issued Patent	10,517,491	12/31/2019	2014-898

## RELATED MATERIALS

- ▶ [High-resolution, whole-body vascular imaging with ferumoxytol as an alternative to gadolinium agents in a pediatric chronic kidney disease cohort.](#) Nayak AB, Luhar A, Hanudel M, Gales B, Hall TR, Finn JP, Salusky IB, Zaritsky J. *Pediatric Nephrology* (2015) 30(3):515-21 doi: 10.1007/s00467-014-2953-x
- ▶ [Four-Dimensional, Multiphase, Steady-State Imaging with Contrast Enhancement \(MUSIC\) in the Heart: A Feasibility Study in Children.](#) Han F, Rapacchi S, Khan S, Ayad I, Salusky I, Gabriel S, Plotnik A, Finn JP, Hu P. *Magnetic Resonance in Medicine* 00:00–00 (2014)

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [An Improved Phase-Contrast MRI Technique](#)
- ▶ [High Spatial and Temporal Resolution Dynamic Contrast-Enhanced Magnetic Resonance Imaging](#)
- ▶ [An Accelerated Phase-Contrast MRI Technique](#)
- ▶ [Improved Cardiac Late Gadolinium Enhancement MRI for Patients with Cardiac Devices](#)

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