

Breakthrough MRI contrast agent design continues path to safer, more effective diagnostics

New class of highly stable, protein-inspired MRI contrast agents has the potential to revolutionise medical imaging.

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*Professor Anna Peacock,
School of Chemistry,
University of Birmingham*

Scientists at the University of Birmingham, U.K., have developed a new class of MRI contrast agents – improving their stability to create a significant advancement in medical imaging technology.

Metallo coiled coils had offered exciting opportunities for use in MRI, but their advancement was limited by poor stability. Researchers have now overcome this challenge - making these synthetic protein-like structures viable candidates to develop for use with patients.

Led by Professor Anna Peacock, Professor of Bioinorganic

Chemistry at the University's [School of Chemistry](#), the study introduces a covalent cross-linking strategy that reinforces metallo-coiled coils.

These structures are designed to bind gadolinium, a metal commonly used in MRI contrast agents, offering a novel approach that significantly enhances their performance and safety profile.

The research, conducted in collaboration with scientists from the University of Bristol and Università del Piemonte Orientale in Italy and supported by the EPSRC, has been published in the [Journal of the American Chemical Society](#).

The team found that the cross-linked agent demonstrated a 30% increase in MRI relaxivity compared to its non-cross-linked counterpart, which should improve image clarity at clinically relevant magnetic field strengths. There was also unprecedented enhancement in chemical and biological stability.

Professor Anna Peacock commented: "We've developed a new class of MRI contrast agents that are significantly more efficient than current clinical agents, and we've now made them stable.

"By locking metal-binding peptides into place with molecular cross-links, we've engineered MRI contrast agents that are not only more stable but also deliver a further 30% improvement in effectiveness compared to their non-crosslinked counterparts. The modular nature of these designs paves the way for safer, smarter imaging in clinical diagnostics."

The study also explored performance in Seronorm, a human serum matrix, to provide insights into potential interactions with endogenous biomolecules. The agents retained bio-inertness and structural resilience, closely matching the results obtained in aqueous solution, indicating a strong potential for in vivo applications.

[University of Birmingham Enterprise](#) has filed a patent application for the novel metallo coiled-coil approach, and the researchers are seeking licensing or development partners from industry.

Beyond MRI, the ability to enhance stability and exert precise control over metal coordination environments through this covalent cross-linking strategy presents opportunities for broader applications in catalysis, sensing, and materials science.

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