PARACEST MRI contrast agents that respond to redox status

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Technology description

Although magnetic resonance (MR) imaging offers exceptional spatial and anatomic resolution without the use of ionizing radiation, its relatively low sensitivity has established the need for contrast-enhancing agents. Traditional MR contrast agents, most of which are complexes containing trivalent lanthanide ions such as Gd^{3+}, have achieved great success in diagnostic imaging but are not without limitations. For example, these agents are contraindicated or cannot be used in certain patient populations. Additionally, because they are always "on" and are relatively insensitive to their microenvironment, these agents are generally incapable of being developed as reactive probes that respond only in the presence of specific, biologically relevant parameters such as pH, temperature and redox status. Paramagnetic, CEST-based (paraCEST) agents offer promise in this regard because of their high sensitivity and their ability to be turned on and off simply by adjusting radiofrequency pulses. However, most, if not all, paraCEST agents reported to date are lanthanide complexes, so safety and tolerability across patient populations remains a concern. UB chemists have developed a portfolio of paraCEST agents that might overcome these concerns as they are based on metal ions for which the body has an inherent means for handling. With tunable properties enabling them to respond to specific biological parameters, these paraCEST agents could prove useful as diagnostic aids, in guiding therapeutic development and/or protocols, and in monitoring disease progression and response to therapy.

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