Title: **Novel Calcium Sensitive MRI Contrast Agent: A Potential Agent for *in vivo* testing**

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Ca^{2+} plays an important dual role as a carrier of electrical current and as a second messenger in the brain. Its effects are much more diverse than of other second messengers such as cAMP (3',5'-cyclic adenosine monophosphate) and DAG (Diacylglycerol) as its actions are mediated by large array of proteins including protein kinases. Optical imaging with the help of fluorescent dyes has revealed the important role played by Ca^{2+}; however it is limited by depth penetration and photobleaching side product. Magnetic Resonance Imaging (MRI), owing to its noninvasive characteristics together with its high spatial and temporal resolution doesn't possess such limitations. In order to exploit these characteristics of MRI, Li. et al. (*JACS comm*. 1999) have proposed a smart contrast agent based on the high affinity chelator BAPTA, showing sensitivity to Ca^{2+} concentration in the range of 0.1 to 10 μM with an apparent dissociation constant of 0.96 μM. Contrast agents with such a strong affinity Ca^{2+} chelator are likely to be saturated once the Ca^{2+} concentration exceeds 1μM. We report here the synthesis of a Ca^{2+} sensitive smart contrast agent based on a low affinity chelator APTRA (*o*-aminophenol-N,N,O-triacetate). The agent showed 100% relaxivity enhancement in presence of Ca^{2+}. Besides its excellent sensitivity, the agent was found Ca^{2+} selective in the presence of Mg^{2+} and Zn^{2+}. Its relaxivity response in physiological media such as artificial cerebro-spinal fluid (ACSF) and artificial extracellular matrix (AECM) was found to be 37 % and 27 % respectively. CSF is the fluid that occupies the subarachnoid space and ventricular system around and inside the brain while ECM materials are mostly present in intercellular spaces between neurons and glia. The observed relaxivity changes in these physiological media prove the prospects of the agent for *in vivo* tests.