Abstract

Field Cycling Relaxometry & Biomedical Research: from paramagnetic agents to water exchange across the cellular membranes

S. Aime

Center of Excellence on Molecular Imaging of the University of Torino, Italy

Email: silvio.aime@unito.it

Field Cycling Relaxometry (FCR) has brought outstanding contributions in the field of biomedicine. FCR is the best tool we have to investigate the paramagnetic metal complexes as potential MRI contrast agents. In biological specimens the water proton signal acquired by the FCR technique receives contributions from the inner and the outer cellular compartments whose relative weight is mediated by the extent of exchange between the two environments. The addition of paramagnetic species to the outer compartment allows to modify the relaxation characteristics in a way to allow the determination of the exchange rate across the membrane. The T1-dependence from the magnetic field strength allows a differentiation of the intra-/extra-cellular compartment contributions at low magnetic field in the absence of the addition of external agents thus opening the route to exploit the changes in the intracellular water lifetime as tumour biomarker, either in vitro and in vivo.

Author Biography

Silvio Aime is Professor of General and Inorganic Chemistry at the Department of Molecular Biotechnologies and Health Sciences and Head of the Center of Excellence on Molecular Imaging of the University of Torino.

His main research activities deal with the development of Imaging Probes for MR-Molecular Imaging applications (paramagnetic complexes, nanoparticles, CEST agents, targeting and responsive probes, hyperpolarized Para-Hydrogen containing molecules). He is author of more than 700 peer-review publications and 30 patents. In the last decade his research interests have included the design and testing of imaging probes for other imaging modalities (nuclear, optical and photoacoustic imaging). Awards: 2013: World Molecular Imaging Society Gold Medal; 2013: Fischer Award for Contrast Media Research; 2014: Gold Medal “Amedeo Avogadro” from the Italian Chemical Society; 2015: Member of the Accademia dei Lincei.