

MRI - DTU Orbit (09/11/2017)

MRI

This chapter discusses principles of nuclear magnetic resonance (NMR) and MRI followed by a survey on the major classes of MRI contrast agents (CA), their modes of action, and some of the most significant applications. The two more established classes of MRI-CA are represented by paramagnetic metal complexes (i.e., Gd(III) and Mn(II)) and iron oxide particles, acting on T_1 and T_2^* of the water protons signals, respectively. Along the years many efforts have been devoted to endow these relaxation enhancement agents with improved sensitivity, targeting, and responsive properties that have markedly broadened the range of applications in respect to the clinically used systems. CEST agents represent innovative frequency-encoding probes that yield negative contrast in the MR images upon transfer of saturated magnetization from the agent to the "bulk" water signal. Interesting developments have been attained that markedly increase the number and typology of systems with CEST properties. Currently much attention is also devoted to hyperpolarized molecules that display a sensitivity enhancement sufficient for their direct exploitation for the formation of the MR image. A real breakthrough is provided by the use of molecules (such as pyruvate) that report about the cellular metabolism, thanks to the maintenance of the hyperpolarization in the derived species.

General information

State: Published

Organisations: Center for Hyperpolarization in Magnetic Resonance, Department of Electrical Engineering, Center for Magnetic Resonance, ETH Zürich, University of Torino, University of Freiburg, Lausanne University Hospital, Ecole Polytechnique Federale de Lausanne (EPFL), Technical University of Munich, Bruker Biospin GmbH

Authors: Schroeter, A. (Ekstern), Rudin, M. (Ekstern), Gianolio, E. (Ekstern), Viale, A. (Ekstern), Delli Castelli, D. (Ekstern), Aime, S. (Ekstern), Hövener, J. (Ekstern), Bastiaansen, J. A. (Ekstern), Comment, A. (Ekstern), Düwel, S. (Ekstern), Ardenkjær-Larsen, J. H. (Intern), Becker, M. (Ekstern)

Pages: 227-324

Publication date: 2017

Host publication information

Title of host publication: Small Animal Imaging: Basics and Practical Guide

Publisher: Springer

Editors: Kiessling, F., Pichler, B. J., Hauff, P.

ISBN (Print): 978-3-319-42200-8

ISBN (Electronic): 978-3-319-42202-2

Chapter: 13

Main Research Area: Technical/natural sciences

MRI, Paramagnetic probes, Molecular imaging, Hyperpolarization, CEST, MRS, MRSI, Dissolution DNP, Para-hydrogen, Metabolism, ^{13}C

DOIs:

10.1007/978-3-319-42202-2_13

Source: FindIt

Source-ID: 2372044937

Publication: Research - peer-review › Book chapter – Annual report year: 2017