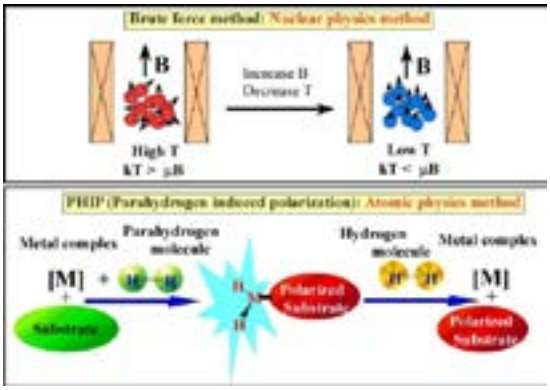
Masayoshi Tanaka et al., J Astrophys Aerospace Technol 2017, 5:2 (Suppl)
DOI: 10.4172/2329-6542-C1-008

Progress in creation of hyperpolarized nuclei for highly sensitive MRI

Masayoshi Tanaka[1,4], Seiji Makino[2], Hisako Fujimura[2], Takeshi Ohta[3,4], Masaru Yosoi[4], Mamoru Fujiwara[4] and **Kunihiro Ueda[1]**
[1]Kobe Tokiwa University, Japan
[2]Wakayama Medical University, Japan
[3]The University of Tokyo Hospital, Japan
[4]Osaka University, Japan

Though the MRI (Magnetic Resonance Imaging) is widely used as a tool for medical diagnoses, its usefulness is rather restricted because of less pronounced NMR (Nuclear Magnetic Resonance) signals due to the smallness of nuclear polarization created at room and body temperature. As a result, it becomes difficult to obtain the images for low-density organs like a lung in a short measuring time. To break this restriction, we started developing a hyperpolarized MRI, where nuclear polarization is generated artificially by sophisticated technologies in nuclear physics or atomic physics, with which we hope the NMR signals would be orders of magnitudes enhanced relative to the NMR systems used so far, thus enabling us to obtain images with high resolution. Currently, we are constructing a device for hyperpolarized ^{3}He gas by means of the Brute Force method with a strong high magnetic field (~17T) and an extremely low temperature (<100mK) and a device for hyperpolarized ^{19}F in PFC (PerFluoro Carbon) often used as an artificial blood by means of the PHIP (ParaHydrogen Induced Polarization) method. No doubt, the PHIP will be successful, the lung image with the very expensive hyperpolarized ^{3}He may be replaced with the cheap PFC. Further, it will be shortly touched that the hyperpolarized ^{17}O MRI may be a potential tool instead of the risky radioactive ^{15}O PET (Positron Emission Tomography) widely used for diagnosis of the brain diseases such as apoplectic stroke. Finally, let me ask for your attention on possibility to detect cancer cells with the hyperpolarized ^{13}C MRI by measuring the rapid change of the chemical shifts due to the metabolic reactions in the cancer cells.



Biography

Masayoshi Tanaka is a Professor of Clinical Technology and Physics and Collaborative Physicist at RCNP, Osaka University. He got the Prefectural Award of Hyogo for research and education in 2013. He organized the int. workshop, HELION97 on polarized ^{3}He beams and gas targets and their application in 1997. He was a Guest Researcher at University of Michigan in 2001, Centre d'études nucléaires de Grenoble in 1990, and at Max Planck Institut für Kern Physik, Heidelberg in 1982.

tanaka@rcnp.osaka-u.ac.jp

Notes: