High-resolution Clinical Imaging on 7.0T MR system

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Outline of survey

Development of *non-invasive* imaging techniques capable of providing microscopic resolution represents one of the ultimate goals in medical science. Even in the era where the importance of quality of life is widely appreciated, certain procedures essential for proper clinical assessment remain *invasive* in nature. Common diseases of the brain requiring an invasive diagnostic procedure for definitive diagnosis include Alzheimer disease, Parkinson's disease, and brain tumors. The main goal of this project is the development of clinical sub-microscopic imaging capable of providing a level of detailed information almost equivalent to conventional microscopic analysis utilizing an ultra-high field (7.0T) magnetic resonance imaging (MRI) system. Imaging methods specially aimed at specific target structures such as senile plaques of Alzheimer's disease or mitosis and necrosis of brain tumors will be developed. The project aims to provide clinical realization of an intermediate state, slightly short of the final goal of unrestricted magnetic resonance microscopy.

Expected results

The project is designed such that the outcomes of research can directly be applied to the clinical arena. The project is expected to provide hitherto unachievable resolution of human brain, the successful application of which to clinical practice and pathologic conditions will undoubtfully represent a giant achievement in modern twenty-first century medicine.

References by the principal researcher

1) Ahrens E. T., Narashmhan P. T., Nakada T., Jacobs R. E.: Small animal neuro-imaging using magnetic resonance microscopy. Progress in NMR Spectroscopy 40. 275-306, 2002.
2) Nakada T.: High-field, high-resolution MR imaging of the human indusium griseum. AJNR 20. 524-525, 1999.

Term of project	2004 2008	Budget allocation	85,100,000 yen

Homepage address	http://coe.bri.niigata-u.ac.jp/coedoc/index.html